

In This Issue—Conquering the Pampas

MOTOR AGE

Vol. XXX
No. 4

CHICAGO, JULY 27, 1916

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ANNOUNCEMENTS

"Wisconsin Calls to You," a story having to do with Waukesha county, Wisconsin, and its environs, and the attraction for tourists, which was to have been published this week, was held that the South American series might begin at once. This will be published next week.

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It has been said that were the National Biscuit Company to discontinue advertising for three months, the good will created and supported by the continuity of their advertising would depreciate millions in value. The explanation lies in the fact that the American public is as quick to forget as it is alert to respond.

Advertising continuity is one of the important requisites of advertising success. To allow advertising to lapse is to lose the cumulative effect of all efforts which have gone before.

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Before the month is out this opportunity will be awarded. Perhaps it will be you. At any rate write for the facts and see.

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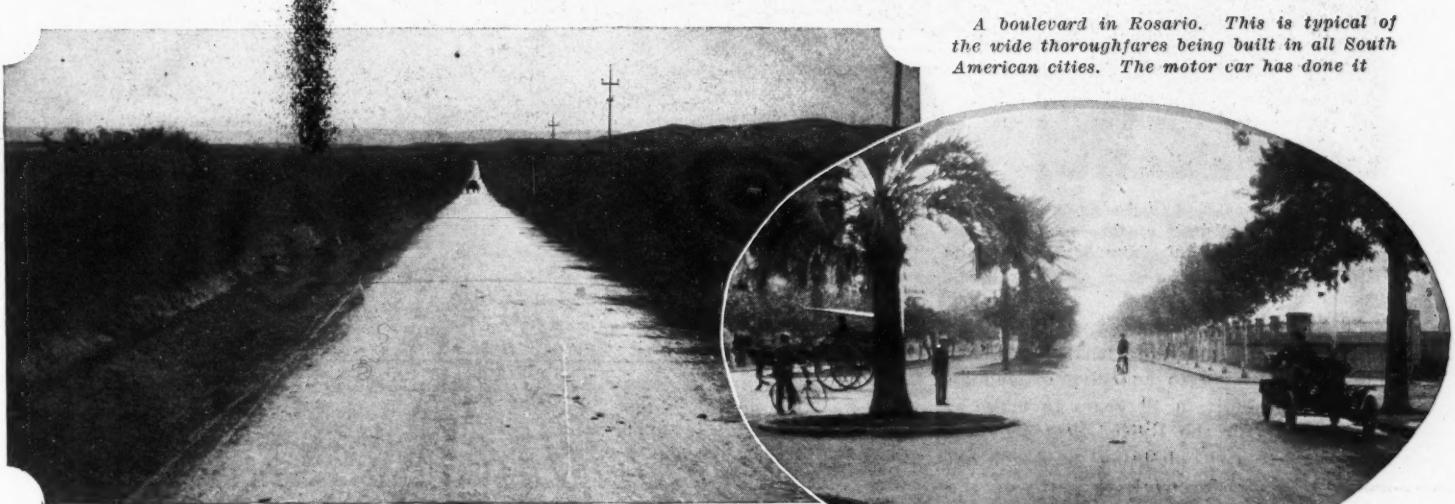
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MOTOR AGE

Conquering the Pampas

By David Beecroft



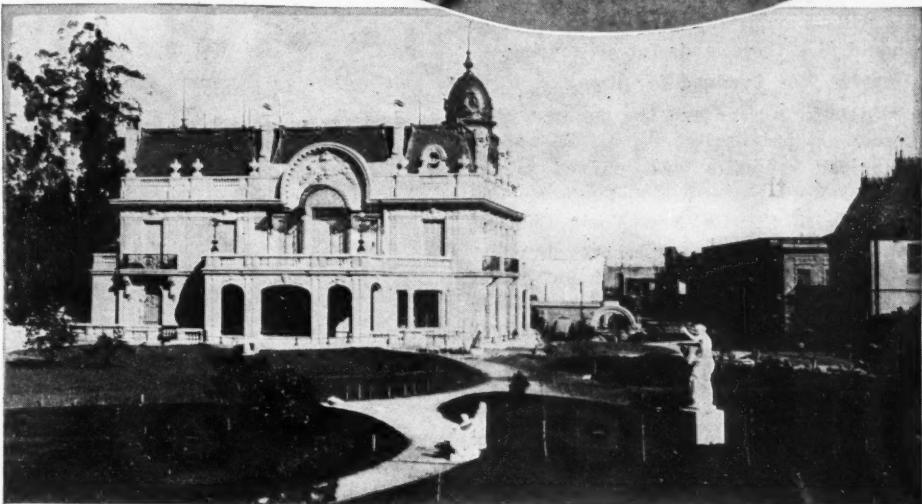
Several stretches of fine macadam roads like this are found on the plains near the Corboda mountains. These run 30 to 40 miles in a straight line. Note the Corboda mountains in the background. Right—Buenos Aires home of a wealthy farmer, or estanciero. A view of his garage will be found on page 10

AS yet South America is not a continent to which you would recommend your friend to ship his car for a 3-months' tour the same as you would recommend Europe or even the same as an European might recommend North America to his fellow citizen. When North America is compared with Europe as a touring ground and when thinking in terms of roads, hotels, and scenery, the comparison is many times more favorable than when you think of South America in terms of North America.

Some day South America will be a wonderful touring continent, but that is years off. Before that day thousands of miles of roads will have to be built and chains of hotels established. South America has the setting and the scenery but lacks the roads and the hotels and population.

South Americans are ambitious; they have comprehensive day dreams of what their land will be in a decade, perhaps two decades and already in several places the work is well under way to make parts of the continent the motorist's paradise. Trans-country roads already are in process of construction, modern bridges are being built, the new highways, true there are too few of them, are models that North Amer-

A boulevard in Rosario. This is typical of the wide thoroughfares being built in all South American cities. The motor car has done it

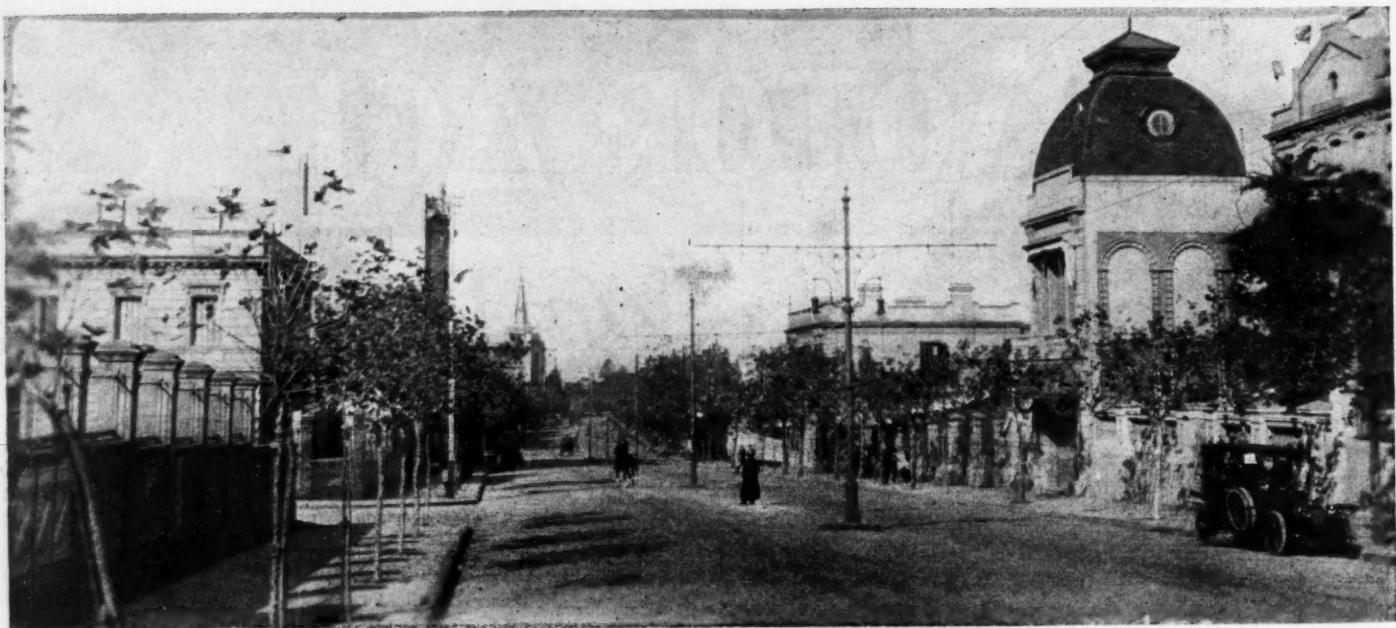


EDITOR'S NOTE—This is the first of a series of articles on South America by David Beecroft, managing editor of Motor Age, who has just completed a lengthy trip through Argentine, Uruguay and southern Brazil. Mr. Beecroft went as a member of a government committee for the express purpose of studying motor car conditions in this part of South America. Besides spending some time in the leading cities, he traveled through a majority of the cities in Argentine, Uruguay and southern Brazil and motored over the majority of the highways that have been improved.

In this first article the author gives general conceptions of South America, a land too little understood in the United States, and tells of the great movement on at present, whereby American cars are being sold in the farming sections of the country. The cities of South America always have been great hotbeds for European motor cars and American cars have had hard sledding. Mr. Beecroft exhaustively analyzes the conditions that brought about the change which is taking place today.

In succeeding articles Mr. Beecroft will tell of the motoring possibilities, not only in the different cities in Argentine and Brazil, but will describe the great highways that are being built for motor traffic and interpret some of the dreams of future motoring that the governments are engaged upon.

All of the illustrations used in this and succeeding articles are from photographs taken by the author and are the first showing actual motor conditions in various parts of south America that have appeared in motoring journals in the U. S. A.



This wide avenue in Corbada, an inland city of Argentine, is typical of the excellent motor thoroughfares found in many South American cities

ica could imitate to her profit. Given peace and continued prosperity it would not be impossible to conceive of enough roads being built in 10 years to make it worth while for the United States or the European tourist planning a 3-months' motor trip in the countries south of the equator, namely southern Brazil, Uruguay, Argentine, Chile and maybe parts of Peru. He will be amply repaid at that time if he should pick these lands for his touring.

Interest Was Confined to Cities

Up until a year ago the motor car interest in practically all of the South American countries was confined to the cities. Here today you find motoring on a par with that in New York, Chicago, Kansas City or St. Louis, with the possible exception that the percentage of cars owned by the middle classes is much lower. Buenos Aires, a city of 1,800,000, which is much larger than Philadelphia and perhaps 500,000 under Chicago, has a galaxy of high-priced cars which challenges Fifth avenue, New York, and from a point of view of show excels Michigan avenue, Chicago. The cars are generally the palatial French, Italian, German, English and Belgian types with bodies built by the finest carriage builders in the old world. London, Paris, Berlin and Antwerp had nothing too good for the wealthy Argentine, the wealthy Brazilian or the wealthy Uruguayan. The fine limousines from the shops of such old world carriage body artists as Vandeplas and Rothschilds abound on the fashionable streets of half a dozen cities, and you find them in a score of smaller cities, but in limited numbers.

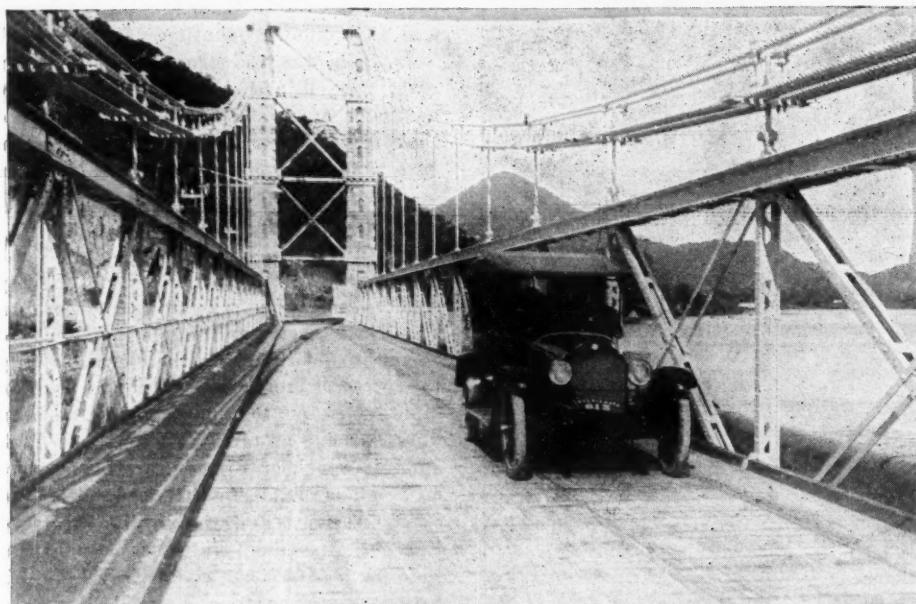
The motor car is not new to South America. Such countries as Argentine, Brazil, Uruguay and Chile had the car as early, in fact, a little earlier, than Boston and



Map of South America showing mountain ranges, sea ports and principal cities. The shaded portion represents the portion with which this article deals



This is a new boulevard in Santos, Brazil. It leads to a beach on the Atlantic where one will find a good 40-mile motor trip on sands as hard as those on which races are held on the Florida coast. These wide streets are common today in most of the South American cities in which the motor car has come into its own

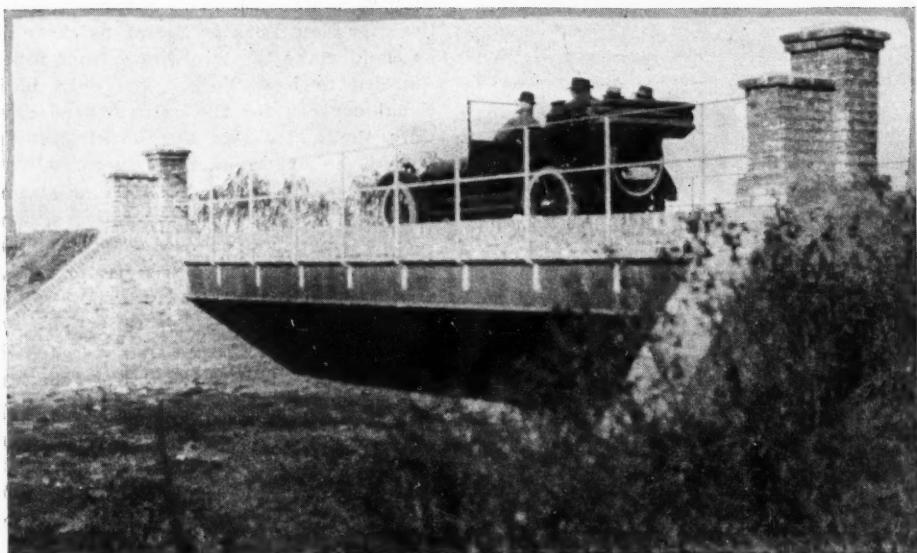


New York, the great centers in U. S. A., for European machines. When Long Island was witnessing its first Vanderbilt cup race, Buenos Aires and Rio de Janeiro were familiar with the gasoline car as made in Germany, France and England. One dealer in this city prides himself on his museum of old cars, European models which antedate anything seen in New York. He has an old Benz built before our conventional form of front axle was in use. In place of the axle each front wheel is carried in a huge fork similar to that used for carrying the front wheel of a bicycle. His museum has many other old models of Benz, Mercedes, Panhard, Renault and a few other makes. He has in his own special depository for such historic models, an accumulation sufficient to stock a Smithsonian Institute.

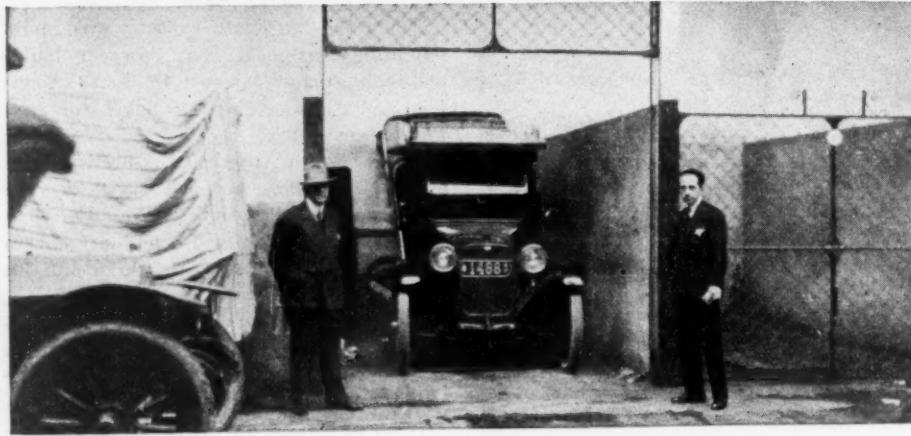
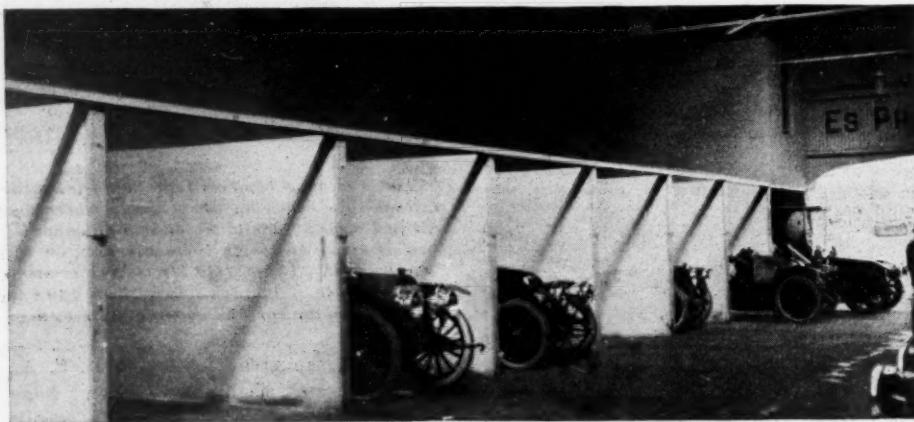
Europeans Found Good Market

When the twentieth century was in its swaddling garments European car builders took greater interest in South American countries as selling fields for cars than they did in the United States or Canada. South America was first in their eyes. Here they shipped their cars in steamboat consignments; here the huge European mercantile and machinery houses took agencies and sold cars in quantities unheard of in North America.

In those days Europe was closer to South America than to North America. It was but natural. A common language bound every country, with the possible exception of Brazil, to the old world. Spanish is today the recognized tongue in Argentina, Uruguay, Paraguay, Chile, Bolivia, Peru, Ecuador, Columbia and Venezuela. Brazil speaks Portuguese and Eng-



Above—One of the new bridges out of Santos, Brazil. This shows conclusively how the road-building movement is taking hold throughout the great country south of the equator
Below—Typical brick bridge with steel girders and stone block floors. On the road from Buenos Aires to LaPlata this kind of bridge is found every $\frac{1}{4}$ mile; a dozen or more in a stretch



Garages in South American cities are models of cleanliness. In the illustration at the top of the page is shown the exterior of a typical, two-story garage in Buenos Aires. This has space for from seventy to 100 cars. In the view just below it is shown the first floor of garage. Note that the stalls have cement partitions. Wire gates close the front. The third illustration shows the second floor of the garage, where cement pillars divide the car spaces. At the bottom is shown a car in its metal stall, this stall serving as a good locker for spare tires, clothing, etc.

lish is the tongue in British Guiana on the north coast. A common language is a great cementer of relationships.

The wealthy Argentine—and he is wealthy in terms of the United States—knew only one city outside of his beloved Buenos Aires and that was Paris. Paris was his acme, his zenith. He worshiped at its shrine annually. For 2 or 3 months each year he lived in the Parisian hotels with his wife and children. Senora, his wife, knew no other fashion center than the shops of Paris. Senor, the man, was fascinated with the goods of London, Berlin, Paris, Antwerp and Rome. Europe was the schooling center for the children. Boys and girls alike spent months and years at the schools of Europe. The Britisher helped fill the colleges of Oxford, Cambridge, London, Winchester and Rugby. The French Argentine sought the convents of Paris for his daughters. The German preferred Berlin and Leipzig, and so with the Belgian, the Italian and the Spaniard. To them the United States was an unknown quantity. Our Harvard, Yale, Princeton, Chicago, Minnesota, Michigan, Cornell and Leland Stanford were unknown names. Our customs were not their customs, our manners not their manners, and over all a different language built a high barrier of division.

The Dividing Line Marked

The paths trod by South and North America were still further asunder. Every country in Europe was tied to Argentine, Brazil, Uruguay and Chile by lines of steamships with which there was nothing to compare from New York to Rio, to Montevideo or to Buenos Aires. Ocean liners, as fine as plied between New York and Liverpool, or Bremen, or Havre, were on regular schedule between cities of South America and the leading ports of Europe. Steamboat rates were such that the South American could travel on his luxurious steamer to Liverpool, Havre or Bremen and then ship in a trans-Atlantic liner for New York or Boston as cheap as he could make the trip direct from South America to New York. The only additional expense for the extra 5 or 6 days were the added tips on the steamships. Should the Argentine want to go to New York direct he had vastly inferior steamers, poorer service, and, in a word, was off the main line of ocean travel. The trip to North America from Rio or B. A., as they are generally abbreviated, was looked upon as a junket on a narrow-gauge, single-track road as compared with the travel on a four-track railroad service.

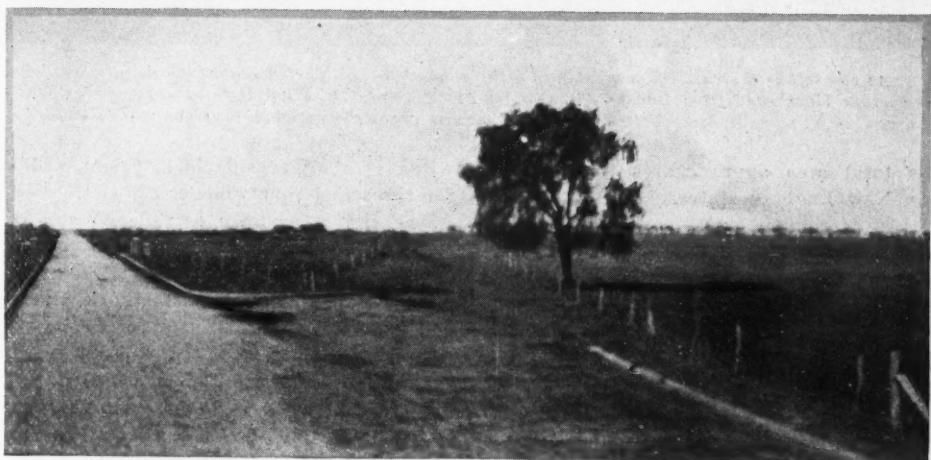
We could proceed indefinitely on this South American-European relationship, but two or three more examples will complete the picture. Walk along the fashionable shopping streets of Rio, B. A., Montevideo pronounced Mön-tah-vé-dā'-ō—Sao Paulo, Santos, Cordoba, Rosario, Santa Fe, La Plata and a score of other cities and you see nothing but European goods. The silver plate is English, the silks are French,

the textiles are English, German or French, the electric goods are Belgian, German, English or French, the books are European; in short, you are looking into the display windows of Europe. South America has been but a huge selling area for all the wares of the old world. True, a few United States makes are there, but they have gained in numbers since the war, when Europe had to stop shipping, but the great rank and file of the goods, the machinery, the motor cars, the bicycles, are of Europe. We are there with our cash registers, our typewriters, our sewing machines, our gasoline, our pickles, our farm machinery and a few other staples, all represented by pioneers who deserve the highest credit for the honorable way in which United States goods have been introduced and which goods today are the greatest advertisement of what the United States can produce.

With these general observations on the relationship of South America toward Europe and the conspicuous lack of relationships with the United States, let us revert to the motor car and what it is accomplishing today in South America. Some generalities must be indulged in. Argentine is the greatest field today for the car. Brazil is opening in certain states and will be an enormous field for the future. The remainder of the countries, with the exception of Uruguay and Chile, are of more remote possibility.

Agricultural and Grazing Country

Argentine is a vast agricultural and grazing country. It is not so magnificent in distances as Brazil, which alone is practically as large as the entire United States of America, omitting Alaska. There are four great land areas of the globe of approximately the same area. These are U. S. A., Canada, Brazil and Australia, and to these can be added Europe. They are in the 3,000,000 class when thinking in square miles. In gaining our conceptions of Brazil we must think of it alone in area as of our own country, as of Canada, or Australia, or the checker board of all Europe. Argentine is smaller, being approximately the same in extent as all of U. S. A. east of the Mississippi river. Chile, on the map, is a narrow stretch on the west coast, and at the south end. It is the most distant from New York of all South American countries, and while on the maps seen in our United States atlas, Chile is a mere streak of color between the Andes and the sea, you soon learn on visiting the country that from north to south it is a little longer than from New York to San Francisco. The motor tourist of 25 years hence may be able to go from north to south of Chile over some national highway longer in mileage than our Yellowstone trail uniting Plymouth Rock with Puget Sound, or our Lincoln highway from New York to San Francisco or our Old Trails road from the Atlantic to the Pacific. Uruguay is smaller, in fact the smallest country in South America, yet



Roads are being made better every year since the motor car came to South America. In the view shown at the top of the page is a section of the motor road from Buenos Aires to La Plata. The middle of this highway is used by the Tour Club of Argentina and the sides for wagons. In the second view is shown the old and the new. The stone road from Buenos Aires to La Plata is seen and the old dirt road branches off at the right. The third view is of a macadam road leading out of Corboda, while in the fourth is shown stone roads 7 miles out of Corboda.



At the left is a steam roller working on the roads between Corboda and the mountains. The trees at the left are eucalyptus. At the right is a stone block road from Buenos Aires to La Plata. Note the stone curb at the side. There is over 60 miles of this road completed. It is the best in Argentina and is a sample of what that country is doing in highway construction

its total area approximates that of our six New England states.

Let us confine ourselves briefly in general comments to a few of the more important countries of South America.

Argentine must come first. It is pronounced almost as written except that the *g* is sounded like *h*. This country of great area has a population of 8,000,000, according to census returns published in May of this year. It equals Canada in population and is much ahead of Australia, which has but 5,000,000. The city of Buenos Aires dominates Argentine much as London dominates England, as Paris dominates France, and, in a smaller sense, as Boston dominates New England. Buenos Aires is a city of no mean proportions with a population of 1,800,000, which puts it ahead of Petrograd and makes it the eighth city in the world, and it is the third city in the new world, New York and Chicago alone taking precedence. B. A. contains nearly 25 per cent of the entire population of Argentine, a situation that has no parallel in North America.

Buenos Aires Magnificent City

It is a magnificent city, one that at first disappoints you and later amazes you. Originally a Spanish city of narrow streets, it is now a city of wide streets, boulevards wider than Chicago or Boston can boast of and parks and plazas that we have nothing in North America to offer in comparison. All of the streets of the city are well paved with square stone blocks, not cobble stones, but stone blocks larger than a brick. They are very smooth, as smooth as brick. Many of the boulevards are asphalt and there is a good deal of Belgian block. Argentine has no stone and so the majority of the paving material was brought from Europe as ballast.

Buenos Aires, within the last few years, has been widening its streets and so much has been accomplished that now every fourth street, in many parts of the city, is wider than State street, Chicago, and has a row of artistic electric light poles in the center between the two street car lines, these posts also carrying the trolley

wires. On either side is sufficient width for three and four vehicles abreast.

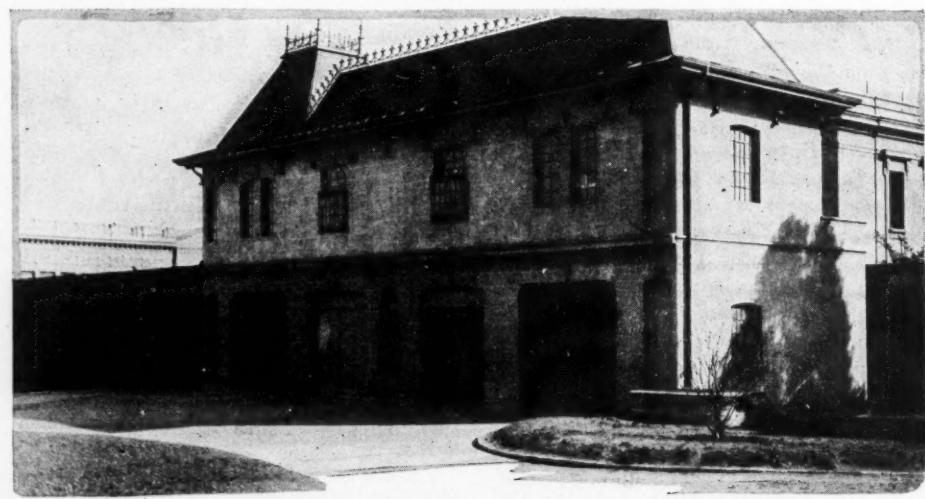
The city is as level as Chicago and in area it is enormous, due largely to the lower buildings. Thus, with its magnificent distances, its wide streets, its plazas and parks, it is an ideal city for the motor car and the motor truck. In fact both are essentials. There are in Buenos Aires hundreds of narrow streets, only wide enough for two vehicles abreast and cutting each other at right angles in true old Spanish style, but to the motorist these are overlooked due to the great number of wide streets which enable the man in the car to go where he wishes.

The garages of Buenos Aires are as up-to-date as those of Chicago or New York, though often not so large. The Argentine is very fond of his motor car. It is a criterion of his social standing, consequently his car is immaculate, his chauffeur and footman would serve as models for fastidious New York and naturally the garage must be the last word in cleanliness. I did not see a dirty garage of over twenty visited in the better residential sections. They are immeasurably cleaner than garages in Chicago, New York, Boston, Min-

neapolis or Denver. So careful is the Argentine of his luxurious Renault, Benz, Mercedes, English Daimler or Fiat limousine that he has it placed in a separate stall in the garage, in reality a separate room, with door and key so that when the chauffeur leaves it no one in the garage can even reach it. The lower floors of the best garages are all divided off into huge stalls around the walls, a stall for each car. Sometimes the partitions are heavy wire grating, sometimes cement. The doors are generally ornamental iron grating. The second and third floors are without these individual stalls, but may have pillars marking the allowed space for each vehicle.

Cars Are Kept Polished

When Mr. Chauffeur takes the limousine out for the Senora—Mrs. in the United States—he polishes it as carefully as milady cleans her spectacles with silk handkerchief and chamois. The elaborate yet delicate inlaid cabinet work is unvarnished, every window is spotless and the exterior carries the polish of a piano. The chauffeur and footman in their regal blues and purples are equally careful about their own appearance so that when the avenues



A Buenos Aires private garage of a wealthy planter. There are hundreds of thousands of these of all kinds



Ford car in region of Andes mountains on a trip from San Luis to Santiago, Chile, in May of this year

are filled with these spic and span equipages, there is little wonder that the Argentine is proud of his Buenos Aires and his well dressed wife and daughters.

Buenos Aires is the home of the taxi; fortunately for Argentine the taxi driver has never learned of the high finance of the New York or Chicago taxi driver. Here you can ride and ride and your bill never seems to reach what it amounts to in New York even before the door is shut. There are 7,000 registered taxis in the city according to the records of the traffic department on June 1. Of these 4,000 are motor taxis and 3,000 horse taxis. Buenos Aires has a law compelling you to use a taximeter if you have a motor car or horse cab for hire. There is no chance of you operating a day without the instrument. This fact accounts for the great number of taxis as compared with other cities of corresponding population.

Taxis Luxurious Vehicles

Many of the Buenos Aires taxis are the most luxurious vehicles you ever rode in. They never were intended for taxis, but were purchased as private cars some years ago. Then the financial crisis of 1911 arrived and the limousine, after taking Señor—Mr.—to the office, went into taxi service until 4 in the afternoon, when Señora and the Señoritas—the wife and daughters—wanted to go shopping. Here you ride in a Delaunay-Belleville limousine taxi with its silk window curtains, its inlaid door panels, its floor pillows for your feet and you can make a trip



A Ford car leaving Villa Mercedes in San Luis for a trip into Chile. Note some of the roads encountered

from your hotel to nearly any business house for 40 or 50 cents, United States gold, or 80 centavos, as they designate it here. Fortunately for Buenos Aires, the taxis do not all try to crowd in front of a few of the more fashionable hotels and a club or so. Here taxis seem to be for the business man. You find them on nearly every street. The law requires that they keep moving about rather than gather in groups or taking possession of the streets in front of the hotels.

What is the United States car doing in Argentine, in Brazil, in Uruguay, in Chile and in a few other countries of South America?

This brings us to our title, "Conquering the Pampas."

In a word the United States cheap car is selling in greater quantities in these countries than it has ever sold before. It is only about a year ago that it started selling in earnest and now in Argentine, Uruguay and parts of Brazil the dealers are 2 to 3 months behind in deliveries. The Ford is the biggest seller.

Its real introduction started 2 years ago when Ford took up the South American field in earnest. Nearly 400 Fords per month are going into Argentine, Chile and Uruguay. Brazil is not taking so many, but on the west coast they are selling in goodly numbers. After Ford comes Overland and Studebaker. Buick has been established for a long time, but is not so big a seller as it should be. Other old-established lines in Buenos Aires are Cadillac, which has been sold by one agent for 14 years, and has naturally a very strong following; in fact, the only American car that has broken into the inner circles of Buenos Aires society, and to this can be added Hupmobile, Chalmers, Hudson, Oakland, etc. New agencies have been placed for Scripps-Booth and National, and during May and June this year agencies were placed for Chevrolet, Dodge, Maxwell, Chandler, King and a few others. The representatives for these makes are at present placing agencies.

For years the Argentine had no use for the United States car. He had no use for

the representatives who tried to sell him our cars. He called them rough necks. It is rarely that this epithet is applied to our business men, but it is very common in Argentine. The Argentine looked upon our machines as amateurs of the amateur. They did not compare with what Europe produced. They were not good enough for Buenos Aires. They gave no social standing. They lacked the body lines, the finish and the class in which the Argentine so delights.

Two events changed the entire situation in Argentine with reference to our cars and it was these two factors that started the sale of our cars in quantities a little over a year ago.

1911 Crisis a Factor

The first factor was the financial crisis of 1911. That date is an epoch in Argentine industry and finance. It is too long a story to narrate: suffice it to say that land values had led to uncontrollable speculation, Europe had oversold the general market and given too long credits and when a shrinkage set in, land values started falling until today they are nearly where they were in 1890 and are at a normal if not subnormal level.

This crisis stopped the sale of motor cars just like a fall stops your watch. It was a full stop. The salesrooms were filled with expensive limousines, landaulets and touring cars and they are today filled with these same cars. Some dealers have not sold a single high-priced car since 1911. True, those dealers, with cheaper cars, have sold them all and would like to get more, but the war has stopped shipments.

The Argentines were land poor. Their values shrank in a night and they instantly stopped buying motor cars. Those motor car dealers who sold cars exclusively went broke. They are not heard of today, but in Buenos Aires the great majority of the motor car dealers are not exclusive car dealers. Rather they are large machinery houses selling threshing machines, traction engines, electrical machinery, hydraulic machinery, farm machinery and everything in the machinery line. With them the motor car was but a side line in 1911. To these large houses the crisis was not so severe. They could and have weathered the crisis and the war on top of it and are still strong and sound. It is in these huge machinery houses that you see the palatial European cars that were on the selling floor in 1911. Not only are their salesrooms stocked with old European models, but their warehouses, or depositories as they call them, are also stocked, and in a few cases there are many cars still in the customs, never having been taken out. This is a most unfavorable situation in the high-priced car field and no United States maker catering to such a clientele should be in a hurry to make shipments here.

Second: Following the crisis of 1911 came the war in 1914, just at a time when

these countries were getting back on their feet. When the war came it was a case of jumping from the frying pan into the fire. Europe had financed them, in a word had advanced them money to buy European goods on credits of a year or longer according to demands. When both money and credit were withdrawn on a moment's notice a serious situation followed, but there was one rift in the clouds, and that was the greater demand for wheat and corn grown in Argentine as well as the stronger market for Argentine beef and mutton. Prices took on a war-time aspect and money started flowing into the farming communities just like it did into Minnesota, the Dakotas, Kansas, Nebraska and other wheat states in the United States.

A fortunate coincidence occurred at the psychological moment. Some American car makers were opening the South American campaign, perhaps in the hope of taking some of the surplus that could not reach Europe because of the war. Ford was the leader in this and to his representatives largely must go the credit for starting the sale of United States cars into the country of the Argentine.

You do not use the word "country" in Argentine. The word "camp" is used instead. Camp means country; in fact, it means about everything outside of the city of Buenos Aires. Whether the country is used for growing wheat or corn, or for pasturing tens of thousands of cattle, sheep, pigs or horses it is all camp. Even the cities outside of Buenos Aires are included in the camp.

It was in this camp that European cars had made little if any sales. There were no roads. The European cars were too heavy, the clearance was too low and the tread too narrow as the huge camp carts have 60 inches between the wheels. The big Buenos Aires dealer had never considered the camp as a selling place for his fine cars. He only sought the cities.

Ford Takes to Camp

Ford's men started out on a new theory. They were going to sell in the camp and they were going to sell just the same as we sell in the United States, namely, go out with the car on to the farm and demonstrate there. The work of one Ford dealer perhaps can be cited as a specific instance of the methods pursued in conquering the camp with its huge areas or prairie stretches termed pampas. This dealer, a certain Harris, who had had car selling experience in Texas, was given territory in Pampa Central, a province in central Argentine, one of the newer sections which would compare with our New Mexico as compared with New England states. Harris' task was one of intensive salesmanship and not one of order taking.

Harris took his car and started up and down through the camp, a territory so level that some railroad lines are laid 100 miles at one time without a single curve. He visited the farmer. Here he is not a farmer in our sense, but a bloated land

owner, who measures his farm, Estancia—pronounced Es-stän-see-ah—in square leagues, a square league being 5,760 acres. Some have ten square leagues and others a hundred. There are no small farms as we understand the term in Illinois, Iowa or Ohio. The farmer, who is called Estanciero—pronounced Es-stän-see-air-o—generally lives in a large home on his land, and in the winter goes in Buenos Aires or, before the war, generally spent 2 or 3 months each winter in Paris.

Order Salesman to Leave

Harris was generally told to leave when he made his first call. In many places he was ordered off. His Ford was no good, no U. S. A. car was any good to them and no car would do in the camp. Afternoon saw Harris back, perhaps only to be turned down once more, but evening found him there again. He simply could not be driven away. Finally he obtained an audience. He immediately got the man in the car and a 4- or 6-hour demonstration started. The car had to be sold before the demonstration stopped. Harris had to prove that the car could conquer the pampas. He drove on every trail and path over the estancia. Some of them are 50 miles in extent and have a system of trails within themselves. The Ford was sent over every one and worse ones asked for. The vast grazing areas without a symptom of trail were conquered. It was demonstrated that the United States car could go on the camp, that it had clearance enough and that its wide tread was suitable for the trails of the camp cart.

After the demonstration was over the wife was taken out, perhaps the children went along and a new demonstration started. After a while the farmer himself got behind the steering wheel, and as his hands learned to whip the wheel from side to side, and as his feet controlled the pedals and his hands the levers, a new factor was entering into Argentine camp life—a new, unborn spirit was being born. The demonstration finished, a sale generally was made.

Soon the news of conquest spread. One estanciero told another. The news spread fast and a new channel for spending the war-time money had arrived. Harris sold 125 machines in Pampa Central from January to June. If this can be accomplished on this seeming outpost of Argentine camp, what can be expected from the enormous fertile areas of such provinces as Buenos Aires, which might be termed the Iowa or Illinois of the country.

We must now journey back to Buenos Aires and visit again those huge machinery stores with their supplies of high-priced European motor cars and their managers who were heartsick of car business and wished they had never taken it up. Little by little the news of camp sales of Fords, Overlands, Buicks, Studebakers and Hupps filtered through. Ford sales reached 100 per month, then suddenly a year ago they jumped to over 300 per month, then almost

reached 400 and have been running in that quantity ever since.

A sudden change followed. These Buenos Aires dealers saw their chance to come back, but to come back with a new field of business, selling in the camp and not in the city. Suddenly the stampede for agencies for our cars started and today there is more demand for agencies for United States cars here than there ever was before. Visit the salesrooms here and you see the results of this. The old-time Fiat agency now has the Maxwell and Scripps-Booth on its salesroom floor, along with all that is latest in water pumps, stationary engines and factory lathes. Dodge has been taken into the salesroom with the most exclusive European car and you see Chevrolet in a brand new place and Studebaker located on the best avenue in the city and with a salesroom as modern as in Chicago or Milwaukee and with a selling organization that might give a few ideas in selling efficiency to any of a dozen cities in the United States.

Invasion Not in B. A. Only

However, this new United States invasion is not local to Buenos Aires. It has already spread and is spreading as fast as agencies can be placed. Visit such Argentine cities—you had better consult the map—as Rosario, Santa Fe, Cordoba, Tucuman, Mendoza, Bahia Blanca and two dozen smaller towns and you find our agencies creeping in one by one.

Go into the small country of Uruguay and while Montevideo, the capital city of half a million, has a score of United States agencies, you also will find agencies in such inland cities as Mercedes, Paysandu, Salta and other points.

Visit Brazil and while you do not find Rio much of a market for our cars you find Sao Paulo—that Chicago of Brazil—alive. Over 800 Fords have been sold and a quarter as many Hups. Overland has sold several hundred and new agencies are just being placed for many other makes. We saw a few new Hudsons which have the reputation of climbing more hills on high around the city than any other car.

Such is the past of motor car industry in Argentine and such is the first step of the conquest of those endless pampas that outrival our own Iowa in fertility and over whose green leagues of territory feed millions of cattle and sheep that go by every ship, even to our own shores, to help feed the billions of the world's population. From those never-ending plains come millions of bushels of wheat and corn. These pampas are areas to conjure with. They constitute the greatest grain and meat producing area of the world for general distribution and as such must of necessity develop with stupefying rapidity and what can accelerate that development more than the United States motor cars, motor trucks and motor farm tractors?

Ban on Twin City Track

A. A. A. License Withdrawn and Sperry Is Suspended for 2 Years

Indianapolis Asks Sanction—Resta Allowed Two Records

NEW YORK, July 25—Special telegram —The license of the Minneapolis Motor Speedway was withdrawn today by the contest board of the A. A. A., because of troubles in connection with the recent races there, where the prize money was reduced and where other difficulties arose. Mr. Sperry, manager of the speedway, was suspended for 2 years, dating from July 4, 1916. Because of trouble with cash prizes at the Sioux City speedway meet, where the drivers were given a percentage of the gate receipts, it was ruled that no future sanctions will be issued where percentage prizes are offered. Only cash prizes posted in advance will be allowed.

Indianapolis has asked for a speedway sanction for September 9 for a championship race of 100 miles and two other shorter races. The purse is to be \$9,000. A new 50-mile competition record was granted Dario Resta in his match race with de Palma on the Chicago speedway June 18. The time allowed is 31:57.4. The record for 10 miles was also allowed Resta, the time being 5:51.2.

MOTOR RESERVE IN SOUTH BEND

South Bend, Ind., July 22—Prominent South Bend citizens have joined in a movement for the organization of a volunteer motor car corps for the purpose of keeping the war department advised where it will be possible to secure motor cars in South Bend with the least delay should an urgent need arise. If such an organization is completed through the sanction of congress, it will be the first of the character in the United States. The movement was originated by Edgar A. Stoll, of South Bend, who has prepared a bill to be presented to Congress, which authorizes the formation of the volunteer motor car reserve corps.

S. A. E. IN DEFENSE WORK

Washington, D. C., July 21—For the first time the Society of Automobile Engineers has taken an officially recognized place in the work of national standardization. This was on the occasion of the meeting of the newly-appointed aeronautic engine division of the S. A. E. standards committee which met here this week at the Bureau of Standards, representatives of the bureau, of the army and navy and of the aviation industry being present. The chief business was to discuss the program of the division which was created because the army and navy authorities consider it vitally important

that many things in connection with aeroplanes should be standardized with the greatest rapidity possible. The meeting was in every way a success, and it is obvious that the most vital matters will be handled very quickly.

NAMED S. A. E. COUNCILLORS

New York, July 24—In the list of new S. A. E. nominations giving the officers of the coming year there appear the names of Harry L. Horning, Waukesha Motor Co., and Charles W. McKinley, Willys-Overland Co., who are nominated as councillors to serve for 2 years. These nominations were omitted from the list given at the time of announcement.

S. O. IN PRICE FIGHT

Milwaukee, Wis., July 22—Full-page advertisements were published in every Milwaukee daily newspaper during the last week by the Standard Oil Co. of Indiana, headed, "You Are Paying Too Much for Gasoline." The advertisements point out that to pay more than 18.6 cents per gallon, is paying too much.

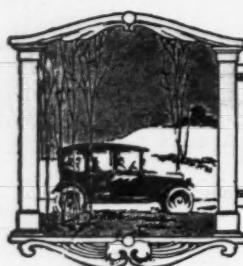
The heavy advertising campaign is believed to be another step in the war that has been waged between the Standard and the independent oil men for many months. The city of Milwaukee is literally sprinkled with filling stations, and at prominent intersections, both the Standard and independents maintain stations, at which gasoline is sold at 1 cent above tank wagon prices. Motorists no longer buy gasoline from garages—that is, very few do, because they can get their fuel cheaper at the filling stations and have only a few blocks to go to get it.

There is considerable variance in prices in Milwaukee. The Standard Oil Co.'s filling station price on Red Crown is 18.6 cents per gallon.

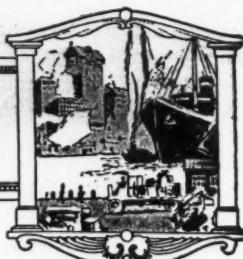
STUDEBAKER ON HIGH-GEAR RUN

Hartford, Conn., July 22—Howard Kinney, of the Colonial Automobile Co., drove a Studebaker six-cylinder car 140 miles Friday with the gears locked in the high-speed position. The object of the test, which was witnessed by representatives of the Hartford newspapers, was to demonstrate the ability of the Studebaker to make the hard hills in top gear.

The notorious Southington mountain, which has proven a stickler for many a good car, was negotiated in fine form. Plymouth hill, another hard and long grade, was overcome handily. The route lay from Hartford to Waterbury to Farmington, thence over Avon mountain, where all Hartford turns out to prove the hill-climbing capacity of its cars. At the top of this latter slope, Kinney had the six going 45 miles an hour. Just to make it good measure, the trip was resumed from Hartford, over the Berlin turnpike, to Cromwell, and back to Hartford up the Connecticut river valley.



EDITORIAL PERSPECTIVES



Roads for Speed

IS the day not approaching when motorists must stand out for a higher legalized speed on our country highways and perhaps a higher speed in many suburban sections? This was too delicate a question even to suggest a few years ago, when motor cars were increasing alarmingly in numbers and accidents naturally were also on the increase. Unfortunately too many people did not recognize that accidents were not increasing in proportion with the increase in cars.

RETURNING to the question: Let us first of all soberly ask ourselves the question, will a higher speed be injurious to the welfare of the general public? Further: would a higher speed on the highways cause more accidents?

THESE questions are impossible to answer, but are worthy of discussion. Very few of our accidents are due to speed alone. Perhaps with the amateur motorist speed is the direct cause. He may not be able to control the car at a certain speed when the exigency arose, whereas he might have been able to control it at a lower speed. This, however, is the exception.

OUR improved highways permit of much higher speeds than 5 years ago and permit of it with perfect safety. Many of our roads are wider, they are smoother and they are straighter. These factors all conduce to safety. Our drivers, the great rank and file, are better than they were a few years ago. Soon it will be as natural for our population to drive a motor car as it was for it to drive a horse 10 years ago. Motor car driving is fast becoming second nature to quite a majority of our 105,000,000. These factors all speak for a higher legalized speed on the highways.

THE spirit of the motor car is for higher speeds. Why have a speed law of 20 miles in the country when everybody breaks it, and the law should be 30 miles per hour. It is not good ethics to have people breaking a foolish law all of the time. It tends to breed a spirit of law breaking. It would be immeasurably better to have a speed law of 30 miles, as some states have, and see that it is rationally enforced. The increasing number of motor cars makes it essential that speedy relief be obtained in the confines of several of our large cities. In a few cases it will be more satisfactory so far as speed is concerned to own a horse and buggy than to own a motor car. The streets on a Sunday afternoon are clogged and the legal pace so slow that all see it as ridiculous. Paces of 15 miles per hour are insisted on, which are absurd. They are not necessary for safety. Such is not the spirit of motoring. There is a

difference between reckless driving and safe driving, but reckless driving may not mean 20 or 25 miles per hour when the legal pace is 15.

THE question of street congestion is becoming very serious and soon may be looked to interfere with the sale of cars. We will have to obtain higher speeds and wider streets. If we cannot get wider streets then it will be necessary to build special motor highways in our cities. Time must be economized. The motorist is the person living under the restriction and it will be up to him gradually to set in motion the educational campaign for a higher legalized motor speed.

THOSE opposed to higher speeds will immediately raise the cry that speeds are too high today. That is true for the reckless or incompetent driver, and if speeds were one-half less than they are today the same would be true, but those who complain must look the matter square in the face. Today our police do not always use that good judgment that the occasion requires. They arrest for the technical violation of a speed limit. They do not make enough arrests for careless driving. Everyone has witnessed cases where accidents were narrowly averted by a careless driver. Because the accident did not happen the driver went scot free. The policeman did not even give a good warning. That driver should have been arrested and fined. The fine would then have been a positive warning and probably would have prevented an accident at some later date.

THE old adage, "An ounce of prevention is worth a pound of cure," still breathes of good common sense. Why not actively apply this adage and get out policemen working more along the line of prevention than along the line of cure? How often have you seen the motorcycle cop lying in hiding at a corner where he knew motorists might do a little speeding? If that speeding is going to result in an accident at that corner, then the cop should be out in the middle of the street where the motorists can see him and cut down speed. Too much of the police activity in arrest is negative. More positive effects are desired. It is better to have policemen on motorcycles in uniforms so that everybody knows them than to have them in some deceiving costume. If it is beneficial to have our policemen in uniforms on the street corners controlling traffic, then it is also better to have our motorcycle cops in uniform. Thanks to good, active work of some motorists, this is being accomplished in a few of our cities, but it should be the rule in every city and town in the country.

Conquering the Pampas

With the feature story of this week, "Conquering the Pampas," Motor Age begins a series of articles on South America, written by David Beecroft, managing editor of this paper, who has just returned from a 10-weeks' trip to that part of the Western Hemisphere lying south of the equator, where he made a close study of conditions appertaining to the development of that territory as a motor car market. In the first instalment a general survey of conditions in the Argentine, Uruguay, Chili and Brazil is covered and in the instalments to come every phase of motoring in the major countries of South America will be taken up in detail, both as to present conditions and future prospects.

Case for a Solomon

Involves the Identity of Four Fords When Owners Can't Pick 'Em Out

Cars Stolen and Distinguishing Marks Removed

HAD King Solomon visited the police court in Louisville, Ky., this week and heard the case which involved the identity of four Fords memories of the two women who claimed the same baby, no doubt, would have flashed before his mind. Five owners—Deputy Sheriff Lee Barbour, Dr. J. P. Shacklett, Walter Bliss, Dr. Charles K. Beck and C. M. Rankin—had their cars stolen at some time during the past month and reported their loss to the detective department. After some tall manipulating of the arms of the law, four of the cars were brought to headquarters. Three men were arrested in connection with the case.

Testimony of the witnesses showed that the cars stolen had been torn to pieces and reassembled, after having been taken to a garage. Dr. Shacklett, the first witness, testified that he looked at the four Fords that had been found in the garage and he had found that car No. 1 had his chassis. His fender was on car No. 2, as was his wheel. The radiator of his car was on car No. 3, he stated. The top of the doctor's car was on car No. 4. Owing to the great many serial numbers on different parts of the car to which reference had to be made so often, both witnesses and counsel became fatigued during the trial. Two of the men on trial, were held to answer to the grand jury, in the sum of \$1,500 each. The third man was dismissed.

MOTORIST HATER BUYS CAR

Worcester, Mass., July 22—Chief James Quinn, better known as "Auto Jim" known the country over as the hater of motorists, and whose name gave all those who traversed through the little town of Leicester, a few miles from here, a chill, has become a motorist. He is the man who haled nearly the whole Glidden tour into court a few years ago, and came near breaking it up on its way to Boston, because the drivers had to go to court when they were supposed to be on their way. And his action at that time caused the officials of the Worcester Automobile Club to hire a band, and proceed to Leicester that day, the band playing a dirge while the tourists followed behind at a couple of miles an hour. But he did not care. He continued his traps and he made a good thing out of them. It was due to his work primarily, and a few others, that the state law was changed abolishing traps. Motor clubs throughout the country in mapping out routes took care to tell tourists about Lei-

cester and Jim Quinn. Now that he has bought a motor car some Bay State motorists are praying that he makes a tour outside his own bailiwick and gets arrested so he may have a taste of what he did to hundreds of others.

PUP TENTS HUB CAR EQUIPMENT

The military fad has hit the exclusive North Shore summer colony of Massachusetts, and now pup tents have become an adjunct to the motor cars owned by some of the wealthy residents. At some of the best beaches there are meagre facilities for securing places in which to undress and dress, so the wealthy people have solved the problem as a result of many having been to camp before the regiments went away.

So any day now it is not unusual to see a car swing down the boulevard and stop where there is a good spot to bathe. The chauffeur gets out and unslings the tent and pegs it to the sand. Then milady enters. After her swim she gets into the tent again, with the chauffeur on guard, and soon steps out all dressed. Then, the driver takes down the tent, makes it fast to the car and speeds away. Now some of the chauffeurs are wondering whether military experience in tent pitching will get them an increase in salary. Car makers may make tents stock equipment.

Speed Trap Is Spotted

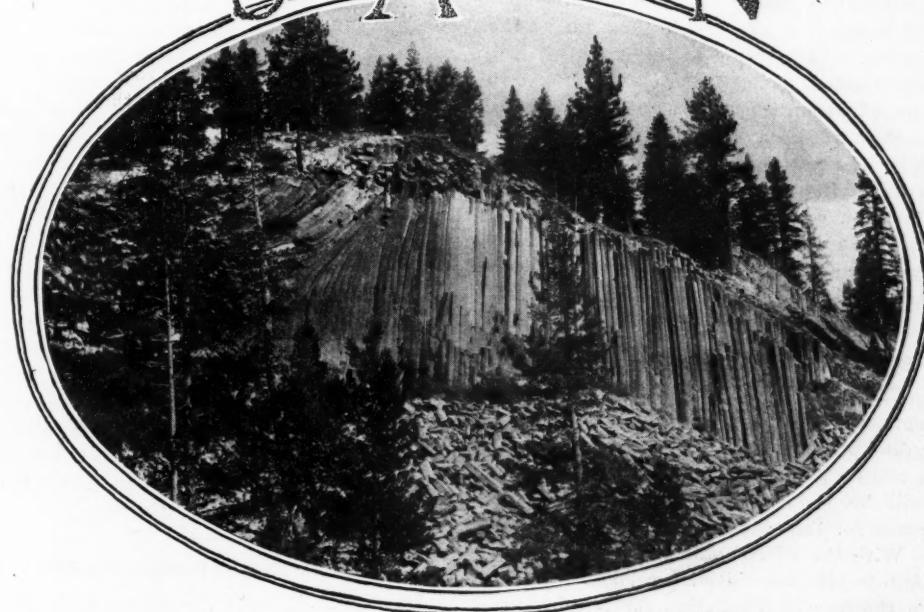
Jasper, Mich., Man Gives Tourists a Tip on Cops' Activity

Point Is Near Ohio-Michigan Line on Fort Wayne-Detroit Route

JASPER, Mich., July 17—Editor Motor Age—For the benefit of tourists that travel through this section of the country I wish to inform you that there is a speed trap maintained on the Ft. Wayne-to-Detroit route—shown in the Blue Book—beginning at a point 1½ miles south of Jasper and extending a little over 3 miles north on the new stretch of state trunk-line highway that has just recently been completed.

The method that is employed to ensnare well-meaning motorists is for the motor cop to come up from behind and travel as close as he can and most drivers will then turn to one side, giving him the road. The motor cop will then run side by side with the machine and if in getting back into the road a driver exceeds the 25-mile speed limit he will have to appear before the justice of peace. —Francis Witt.

See America First • • • See America Now



EDITOR'S NOTE—This is the eighty-eighth of a series of illustrations and thumb-nail sketches of the scenic and historic wonders of America to be published in Motor Age for the purpose of calling the attention of motorists to the points of interest in their own country.

NO. 88—THE DEVIL'S POSTPILE, IN SIERRA NATIONAL FOREST

THE Devil's Postpile, in the Sierra national forest of California, consists of basaltic rocks laid down in the form of an immense pile of posts, and while there are similar formations in different parts of the country, this is especially prominent, being one of the most noted of its kind on the continent, and said to rank with the famous Giant's Causeway on the coast of Antrim in the north of Ireland.

England Abandons Revenue Raising Plan

Proposed Horsepower Tax for War Purposes Superseded by Gasoline Levy

ONDON, July 15—England has abandoned the threatened double and treble taxes on motor cars in favor of a special war tax of 12 cents per gallon on gasoline. The amount will be reduced to 6 cents per gallon in the case of doctors and veterinary surgeons. Although the scheme has not yet gone through parliament, and is likely to be modified in its details before it finally becomes law, its main features are the use of gasoline permits, supplied monthly for a specified amount of fuel, and the payment of the tax at the rate of 12 cents per gallon at the time of taking out the permit.

The recent motor car census has paved the way for this scheme. Owners of cars will have to apply to a central authority for a permit to purchase gasoline, and obviously this authority will have power to refuse the permit or to restrict the amount to be purchased. The tax will be paid at the time of taking out the permit, and gasoline can only be obtained on presentation of this document to the dealer. These permits will only be issued for periods of one month. It is officially stated that the gasoline tax will only be in force for the length of the war. The revenue obtained from this source is expected to be \$4,810,000 per annum.

Generally the new scheme is received with much more favor than the original proposal to double all taxes on cars up to 16 horsepower and treble them above that power. As horsepower is very arbitrarily determined under the English rule, owners of expensive American cars with big motors were heavily handicapped compared with the possessors of expensive European cars having small bore engines. The gasoline tax ought to bring in a bigger sum than the car tax, and obviously will cause motorists to pay in proportion to the distance traveled.

SANCTION SPEEDWAY GRAND PRIZE

Chicago, July 22—Final plans were announced yesterday regarding the Speedway grand prix races to be held at the Maywood track on August 19, when the star drivers will be brought together in a series of races for the speedway crown.

With the official stamp of the American Automobile Association placed on the races in the way of a sanction for the date, entry blanks were mailed to those drivers whose cars are capable of making the required speed in the elimination trials of 100 miles per hour—which each must better in order to qualify.

This is the first time that any speedway has ever raised the qualifying time to such a high mark, but it is the opinion of the local speedway officials that it will not

only insure real speed and the fastest cars in racing today with the greatest drivers at the wheels, but it will also eliminate those cars that could hardly hope to win and will prevent the boxing of the faster cars such as was the case when de Palma got caught in the next-to-the-last-lap of the second annual derby in June.

The distances of the races will be five heats of 20 miles each with a final heat of 50 miles. Here again speed will be the feature looked for as the distances are not enough to wear the cars and each contestant will be forced to travel fast from the start.

The winner of each heat will drop out and wait for the final. The other drivers remaining will line up in the succeeding heats for another chance at the final heat and a slice of the \$10,000 prize money which will be divided five ways.

Entry of a car or a driver will be by invitation only and twenty-four drivers have been sent entry blanks.

GLARE CRUSADE IN EAST

Boston, Mass., July 24—Motorists from other sections of the country visiting New England from now on had better see to it that their headlights conform to the laws, for a general crusade has been started in this territory. The Massachusetts Highway Commission has written letters to every chief of police in the state, enclosing a copy of the law and calling attention to the fact that it has been on the books since January 1 but without enforcement.

As the chiefs of police throughout the state rely upon the Highway Commission to aid them in rounding up motorists who defy the laws, the police officials will now busy themselves. The Massachusetts law requires all cars to show an object distinctly 150 feet ahead, 10 feet on each side, and not dazzle any person by throwing a glare into the eyes. The latter is covered in the rule requiring no glare above $3\frac{1}{2}$ feet above the ground 50 feet ahead of the car. Merely dimming the big lights and using the small bulbs do not cover the law, for the bulbs do not throw light ahead far enough to see an object 150 feet or light the side of the road.

TRUCK TOO FAST FOR JUDGES

Utica, N. Y., July 22—Between 13 and 14 miles in 36 minutes and 35 seconds on a fraction over 1 gallon of gasoline, with 1 mile of hill climbing, was the sensational 2-ton truck performance that featured the fourth annual hill climb at Oriskany Falls this afternoon. In a program including motor truck, motor car, and motorcycle contests, a White truck won the commercial car event for 2-ton vehicles in unex-

pectedly short time. The truck swung back into Oriskany Falls from Knoboro with its 2-ton load of cement and was half way up College Hill before the judges, with dinners half finished, were able to get within hearing distance of it. The judges had calculated about 1 hour for the circuit of the track and almost missed the finish.

In the motor car events H. W. Skinner took the feature events in a Chalmers. Other events were won by Buick, Cole and a Lozier. A women's contest was won by Mrs. A. W. Masters in a Chandler.

MERCER MAKES SHOWING AT OMAHA

Chicago, July 21—The Mercer driven by Mel Stringer and owned by Doctor R. R. Duff, the Chicago sportsman, made a much better showing at the Omaha speedway meet July 15 than the time table published in Motor Age of last week would indicate. The car did not go out in the big race, as stated originally, but finished fifth in the 150-mile race, only 38 seconds behind Henderson in the Maxwell, at a speed of just little under 90 miles per hour. In the 50-mile race the Mercer finished fifth at 91.38 miles per hour, as officially timed. The showing made by the Mercer is noteworthy as it is not a special speed creation, as were most of its competitors, but in general is regular factory speedster production.

FIND NATURAL RACE COURSE

Victorville, Cal., July 21—A natural motor race course has been found between Victorville and Doble, Cal. It is a dry lake about 4 miles long and more than 1 mile wide. The bed of the lake is as smooth as glass and is a composition of salt and natural asphaltum, so hard that the track of the heaviest cars will not show, even on turns.

This lake is situated back from the road some distance, but is accessible and there is some talk of staging a speed meet on the lake this summer. The dry lake is near enough to the mountain resorts to attract large crowds and it is believed that many followers of the motor sport would drive out from Los Angeles to witness an event on such a course.

STATE AID IN WISCONSIN

Milwaukee, Wis., July 22—Approximately 1,270 miles of highway in Wisconsin are being benefited by state-aid construction during 1916, according to figures compiled by the state highway commission, administrator of the state-aid law. The total amount of money available for 1916 is \$4,020,000. The work under way and planned for this year approximates: Graded, but not surfaced, 520 miles; concrete foundation and surfacing, 80 miles; stone macadam, 250 miles; gravel macadam, 300 miles; other permanent surfaces, 70 miles; non-permanent surfaces, 50 miles; total, 1,270 miles. It is figured that on

July 1, 30 per cent of this work was completed, leaving 70 per cent to be finished before frost comes. In addition to the road work, 315 bridges will be constructed this year. The bridge fund available is \$403,100. This includes only state aid, and the county aid fund available makes up an additional \$600,000, covering 450 bridges. Between 20 and 25 per cent of the bridge work was reported completed on July 1.

ROADAPLANE COMPLETES TRIP

San Francisco, July 21—The first Apperson Roadaplane to make a run across the country has arrived in San Francisco. The Roadaplane, driven by Miss Rochester, successfully negotiated the distance in about 9 days running time. This is a splendid record considering the fact that a woman piloted the car the entire distance. She drove the first Apperson Roadaplane to be shipped to New York.

On her arrival, Miss Rochester delivered a letter from Mayor Mitchell, of New York, to Mayor Rolph, of Frisco. This contained a message asking the support of the people of the West in behalf of the Statue of Liberty illumination fund.

CLUB VISITS FLANDERS ESTATE

Detroit, Mich., July 22—About 300 members of the Wolverine Automobile Club enjoyed the day's outing today at the beautiful summer home of Walter E. Flanders, president of the Maxwell Motor Co. Mr. Flanders estate is located near Pontiac, Mich., in beautiful Oakland county, where hills and valleys and lakes abound.

This pilgrimage to the Flanders estate is an annual event which the club's membership looks forward to as a get-together and sociability affair second to none in the year's list of club events. Fishing, base ball, bowling and dancing were on the program.

RUBBER CLUB OUTING

Boston, Mass., July 21—The most truly national event of a social character that the rubber industry has ever planned took place Monday and Tuesday at Boston and Lowell.

The Rubber Club of America is the successor of the New England Rubber Club organized 17 years ago. Originally it was purely a social organization holding annual outings, etc. During the past 4 years the club has developed into a business organization with offices in New York City. The business of the club, which is international in scope, is to represent rubber manufacturers, particularly in matters having to do with the supply of crude rubber. Akron was represented by a large contingent leaving on special cars and headed by H. S. Firestone, who is president of the Rubber Club of America; P. W. Litchfield of Goodyear and W. O. Rutherford of Goodrich, directors of the club, and C. B. Raymond, secretary of Goodrich.

Events of the Week in Motor Circles

Activities of Moment Occur in Various Centers—Several Changes

JACKSON, Mich., July 21—Following the change in name of the Argo Motor Co., Inc., to the Hackett Motor Car Co., as announced last week in Motor Age, comes the announcement of a new model to be known as the Hackett four. While none of the details have been announced, it is stated that the car is built to look like a speed boat and is sturdy of construction, light in weight and beautiful in design. The exact price is not made known, but it is under \$1,000.

ZEPPELIN BREAKS LOOSE

Milwaukee, Wis., July 22—A huge silk balloon, shaped like a Zeppelin airship, attached to a huge sign bearing the words, "Harry Newman Recommends Preparedness," and anchored to the roof of the Harry Newman, Inc., headquarters, during the Milwaukee preparedness parade, July 15, broke loose, carrying with it the mammoth banner. Four days later the balloon was sighted in Lake Michigan off Bailey's Harbor, near Sturgeon Bay, Wis., approximately 350 miles north of Milwaukee as the crow flies. The coastguard crew picked up the balloon and returned it to the Newman house. The stunt aroused great interest throughout eastern and northeastern Wisconsin and hundreds of people scrambled to sight it on its flight.

TRY KEROSENE CARBURETER

Boston, Mass., July 22—Frederick D. Jordan and Dr. E. R. Hackett made a trip to this city from Maine a few days ago in a Ford car fitted with a kerosene generator invented by Mr. Jordan. The device worked all right, and those who have seen it demonstrated believe that it will be a big factor in the fuel problem. He used a low grade of kerosene, such as can be bought for 10 cents a gallon, and traveled from 35 to 40 miles with 1 gallon. Mr. Jordan states that the trouble due to carbon has been eliminated and that the motor can be run almost indefinitely without requiring the spark plugs or the cylinder heads to be cleaned. His trip to Boston was made to give a series of practical tests to some men interested in the device, among them F. E. Stanley, builder of the Stanley steamers, who is now at work building some railroad motor cars.

SHELDON MAKES LARGEST AXLE

Motor Age wishes to correct the statement made in last week's issue to the effect that the new 5-ton, worm-driven rear axle, just announced by the Timken-Detroit Axle Co., is the first of its type yet to be produced. The Sheldon Axle and Spring Co. is producing an axle of larger capacity than this, and shipments have

been going on for over 13 months. The Sheldon unit is built for a tire-load capacity of 18,000 pounds, and is fitted with a novel wheel puller attachment. The operation of demounting a wheel in this 5-ton axle consists simply in removing the hub cap, taking off the wheel retaining nut, replacing the hub cap, and giving a few turns of the wheel removing stud which accompanies the axle.

KING USED CHAMPION PLUGS

New York, July 25—The King eight-cylinder car, which covered 10,850 miles in 2 weeks during the latter part of June without stopping its engine used Champion spark plugs. The object of the test was to demonstrate the stability of the King engine and its equipment.

PERFECTION HEATER ON COLE

Cleveland, O., July 22—The 1917 Cole-Springfield model will be equipped with the Perfection heater, manufactured by the Perfection-Spring Service Co., this city.

NEW FORD BRANCHES

Detroit, Mich., July 21—The Ford Motor Co. marks an expansion of its branch sales and service organizations by the addition of thirty-four new branches.

The cities selected for the Ford establishments are: Akron, O.; Albany, N. Y.; Troy, N. Y.; Baltimore, Md.; Birmingham, Ala.; Des Moines, Ia.; Duluth, Minn.; Fresno, Cal.; Grand Rapids, Mich.; Havana, Cuba; New Orleans, La.; Oakland, Cal.; Peoria, Ill.; Richmond, Va.; Rochester, N. Y.; Sacramento, Cal.; St. Joseph, Mo.; Salt Lake City, Utah; San Antonia, Tex.; Scranton, Pa.; Sioux City, Ia.; Spokane, Wash.; Springfield, Mass.; Tacoma, Wash.; Toledo, O.; Trenton, N. Y.; Worcester, Mass., and Youngstown, O.

With the establishment of the new branches the total number reaches eighty-five, besides the twenty-eight factories.

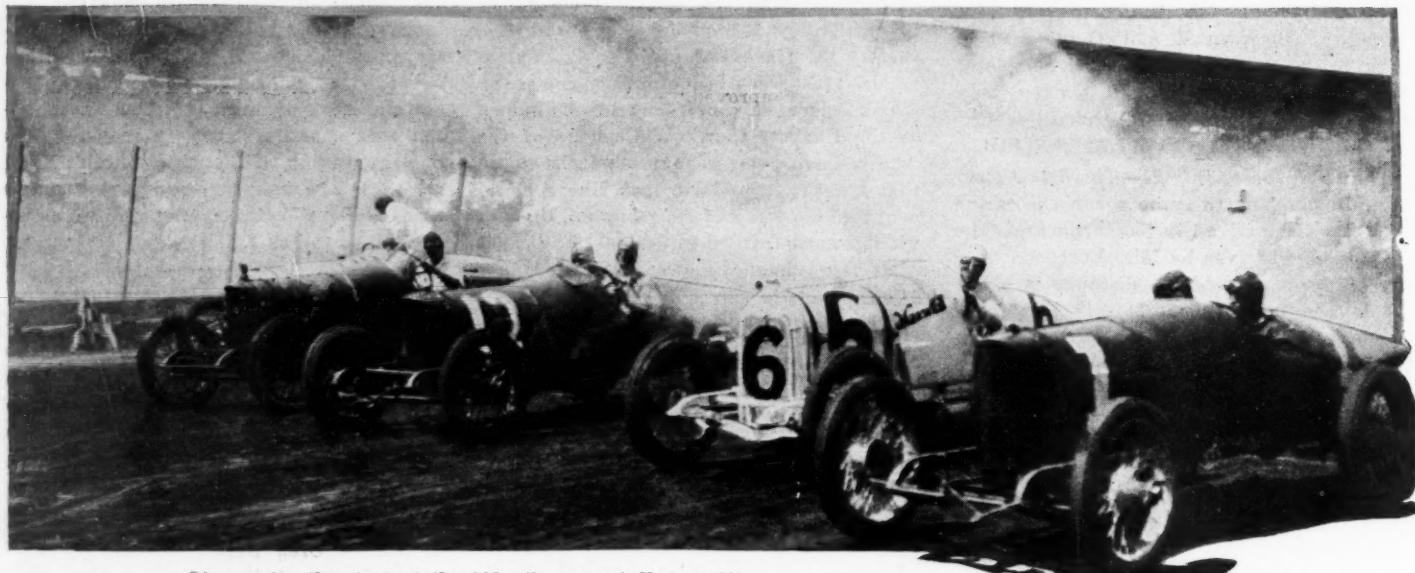
WANTS RESTITUTION OF FINES

Columbus, O., July 22—Restitution of thousands of dollars in fines collected by township justices of the peace from automobile owners, is the request made of the state auditor by Richard H. Lee, president of the Ohio State Automobile Association.

It is Lee's claim that township justices have no right to collect fines on speeding charges, but have the right when they believe a motorist guilty, only to bind him over to a higher court. Many justices have been accepting such fines, and Lee asks the state auditing department to bring out this amount in examination of the justices' books.

De Palma Wins on Choppy Kansas City Track

Rough Course Makes Speed Slow — O'Donnell Injured When Car Goes Through Fence



Line-up for the start of the 100-mile race at Kansas City.

KANSAS CITY, Mo., July 22—Marred by one accident, an injury to Eddie O'Donnell, the daring Duesenberg driver, Kansas City held a successful speedway meet today. Ten thousand enthusiastic Kansas Cityans this afternoon saw Ralph de Palma, in his cream-colored Mercedes, win the 100-mile grind after a thrilling contest with O'Donnell. The Italian's time was 1 hour, 42 minutes and 54 seconds, or an average of 58.48 miles per hour.

O'Donnell Is Injured

After cheering O'Donnell to the echo for his game fight against the veteran Italian, the crowd saw the clever little driver hurtle through the fence on the first turn of the track in a 25-mile event which followed the first race. He was badly bruised but his mechanician was unhurt. A broken steering knuckle caused the accident.

Before the 100-mile race had been half finished the speedway, which is dirt, throughout, became so full of ruts and wallows that it became necessary to shut off the power entirely at some places. The strain on the cars was so terrific that only five out of twelve starters finished although there were six money prizes. Possibly the condition of the course was indirectly the cause of O'Donnell's injury, and undoubtedly it had a great deal to do with the fact that less than half the starters finished the first race. De Palma, after winning the first event, refused to enter the second which had been originally scheduled to go 50 miles, but was cut down to 25 by the officials.

De Palma drove his usual steady race, stopping only twice at the pits. Once was for the purpose of replacing broken

By B. S. Brown

goggles and the second stop was because of tire trouble.

The five cars which stood the test long enough to finish, came across the tape in the following order:

De Palma, Mercedes, time, 1 hour, 42 minutes, 54 seconds, average, 58.48 miles per hour. Prize, \$2,500.

O'Donnell, Duesenberg, time, 1 hour, 45 minutes, 6 seconds, average, 57.02 miles per hour. Prize, \$1,000.

George Buzane, Duesenberg, time, 1 hour 49 minutes and 42 seconds, average, 52.98 miles per hour. Prize, \$600.

Art Klein, Kleinart, time, 1 hour, 54 minutes, and 56 seconds, average, 53.29 miles per hour. Prize, \$400.

Art Johnson, Crawford, time, 1 hour, 54 minutes, 56 seconds, average, 52.60 miles per hour.

Others who started were: Eddie Rickenbacker, Maxwell; Charles Devlin, Duesenberg; Pete Henderson, Maxwell; Billy Chandler, Crawford; Dave Lewis, Crawford; Andy Burt, Ogren; W. W. Brown, DuChesneau.

Rickenbacher Led at 34 Miles

Eddie Rickenbacher, captain of the Maxwell team, who lead the field until the thirty-second lap, or 34 miles, set a hot pace. Up to the time he was forced to quit because of a broken water connection he had averaged 66.77 miles per hour. This was before the track had been so badly torn up and is better than the average dirt track record. When Rickenbacher relinquished the lead to O'Donnell, the Duesenberg driver maintained first place until the sixty-sixth lap, when de Palma took it from him in a sharp brush

in front of the grandstand. De Palma had been driving carefully all the way and was taking the outside to avoid the holes in the course.

After being headed, O'Donnell did not push de Palma, and took the bad places in the track, one of which afterwards caused his injury, with the power off. He was safely in second place, however, not being pushed at any time.

The heat was terrific and bothered several of the drivers. Art Klein was overcome, and was replaced at the wheel by Ora Haibe, but resumed his place a half hour later and drove to the finish in a thrilling fashion taking little heed of the rough places in the track, although he was so far behind and had no chance of catching the leaders.

Track Soon Cut

A bad accident was narrowly averted because Burt stopped his Ogren car at the pit just before his rear axle, which had been cracked, became dangerous. He was third in the race at this time but could not resume.

The track developed two bad spots before the racing had progressed very far. One was on a timber bridge which carried the course over a ravine on which about 2 feet of earth had been piled. Another was on the far turn just before rounding into the back stretch.

The time at different periods of the 100 mile race and the leaders follow:

10 laps—Rickenbacher, Maxwell, time, 10 minutes, 3 seconds; de Palma, second, O'Donnell third.

20 laps—Rickenbacher, Maxwell, time, 21 minutes, 41 seconds; Burt second, de Palma third.

30 laps—Rickenbacher, Maxwell, time,

33 minutes, 23 seconds; O'Donnell, second; de Palma third.

35 laps—O'Donnell, Duesenberg, time, 39 minutes, 10 seconds; de Palma second; Buzzane third.

40 laps—O'Donnell, Duesenberg, time, 45 minutes, 19 seconds; de Palma second; Buzane third.

50 laps—O'Donnell, Duesenberg, time, 57 minutes, 5 seconds; de Palma, second; Buzane third.

60 laps—O'Donnell, Duesenberg, time, 1 hour, 8 minutes, 45 seconds; de Palma, second; Buzane third.

70 laps—de Palma, Mercedes, time 1 hour, 20 minutes, 34 seconds; O'Donnell second; Buzane third.

89 laps, 100 miles—de Palma, Mercedes, time, 1 hour, 42 minutes, 54 seconds; O'Donnell, second; Buzane, third; Klein, fourth; Johnson, fifth.

In the second event, the steering knuckle on O'Donnell's car gave way on the rough ground crossing the bridge and his car becoming unmanageable, crashed through the high board fence. O'Donnell was thrown against his steering wheel and suffered painful injuries about the head and face which may be serious, as well as a compound fracture of the left arm. His mechanician was unhurt.

O'Donnell was given emergency treatment and hurried to St. Mary's hospital. Although there were many spectators near the point where the Duesenberg took its plunge, none were hurt. The car made a 20-foot aperture in the fence. The second race never was finished, the only two contestants being left on the course after O'Donnell's accident being flagged down at the end of the fourteenth lap. W. W. Brown, driving a DuChesneau, who was leading at that time, probably will be given first money, however, \$600. Art Johnson, who was also on the course in a Crawford, probably will be awarded second prize, \$400.

There were six starters in the second event, but before five laps had been completed three of them had dropped out because of the hard going. They were: Rickenbacker, in a Maxwell; George Buzane, in a Duesenberg; and Art Klein, in a Kleinart.

In spite of the discomforts of indifferent street car service and the hot weather, the speedway meet furnished enough thrills to send the big crowd away satisfied and the promoters are talking of making the event a permanent thing in Kansas City.

Drivers were prone to excuse the condition of the track on the ground that it was the first time it had been worked out and it is believed today's experience will give the builders enough tips so that the next track will be a fast one. There is some talk of building a board course, although no definite plans have been decided upon.

O'Donnell Recovering

Kansas City, Mo., July 25—Special telegram—O'Donnell will be out of the hos-

pital in 2 weeks. Another meet may be held here October 7, and plans are underway for strengthening the track.

CINCINNATI TRACK TESTED

Cincinnati, O., July 22—That portion of the new Cincinnati motor speedway at Sharonville which has been completed is being subjected to various tests daily to ascertain in what respects, if any, the new track can be improved. So far the speed trials, made with a small stock car, have demonstrated that the track meets all requirements for attaining a high degree of velocity. In every instance the speed registered has been in excess of the standard limit fixed for the car, showing conclusively that the track is in the best possible condition for record-breaking performances when the big cars are put to the tests on the opening day.

Racing Events

*August 5—Tacoma, Wash., speedway races.

August 17—Track meet, Boise, Ida.

August 19—American speedway grand prize, Chicago.

August 26—100-mile track meet, Kalama-zoo, Mich.

*September 1-2—24-hour race, Sheepshead Bay.

September 4—Track meet, Newark, N. J.

*September 4—Speedway race, Cincinnati, Ohio.

September 4—Track meet, Elmira, N. Y.

September 4—Des Moines, Ia., speedway race.

September 4-5—Track meet, Spokane, Wash.

*September 4—Cincinnati speedway race.

September 9—Indianapolis speedway race.

September 16—Speedway race, Providence, R. I.

September 18—Track meet, North Yakima, Wash.

September 29—Track meet, Trenton, N. J.

September 30—New York, Sheepshead Bay speedway race.

October 7—Philadelphia speedway race.

October 7—Omaha speedway race.

October 14—Chicago speedway race.

October 19—Indianapolis speedway race.

October 21—Track meet, Kalamazoo, Mich.

*November 16—Vanderbilt cup race, Santa Monica, Cal.

November 18—Grand Prize race, Santa Monica, Cal.

November 30—Speedway, Los Angeles, Cal.

December 25—Speedway, Los Angeles, Cal.

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*Sanctioned by A. A. A.

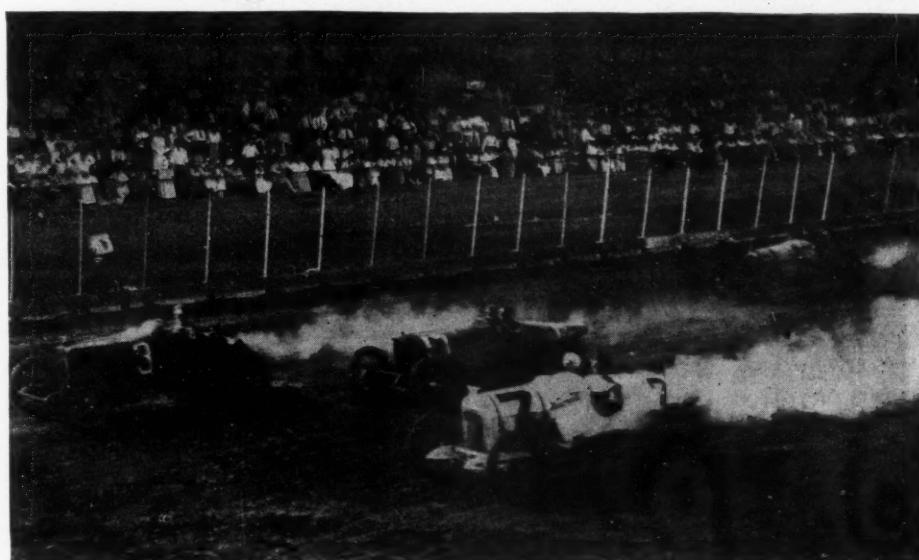
Much gratification is felt in the offices of the speedway management over the manner in which entries are being received. The total number of drivers now officially listed is twelve, the latest additions being Art Johnson, Billy Chandler and Dave Lewis. All are Americans and each will drive a Crawford Special—an American-made car. More entries are promised for the coming week, making it certain that the full limit of starters allowed by the contest board of the A. A. A., namely, thirty-two, will face Starter Fred Wagner in the 300-mile \$30,000 race on Labor day.

According to the plans for prize distribution in the first international sweepstakes race, this event will make a new speed record for the distance of 300 miles. Instead of merely offering prizes for those finishing in various positions, the Speed-way management has added three special prizes of \$500 each for cars leading at certain distances, thereby assuring maximum speed at all times.

FATALITY IN PORTLAND MEET

Portland, Ore., July 24—Special telegram—Ulysses Aubrey, driving Tacoma Special and mechanician Frank Lake, were instantly killed in the Australian pursuit race on the Rose City speedway today. A series of accidents marred a good race program with record crowd in attendance.

F. M. Penticost, driving the Schneider Special, went through the fence, but was unhurt. M. J. Mossie, of Los Angeles, in the Grandy Special, plunged 300 yards and his car jumped 22 feet in the air with broken steering knuckle. The 50-mile race was won by Omar Toft, of Los Angeles; time, 49 minutes, 27 $\frac{1}{2}$ seconds. The 20-mile race also was won by Toft in 20 minutes, 29 $\frac{1}{2}$ seconds. The fastest lap of the mile dirt track was made by Rea Lenz in the Romano Special, of Seattle, in 5 seconds.



A brush in front of the stands. Art Kline, in No. 3, is making up lost time

Plan Desert Road Race

Course Will Be Over Arrowhead Trail, Los Angeles to Salt Lake City

Entries for Long Grind Promised —Tentative Date October 10-12

SALT LAKE, Utah, July 21—There is to be a great desert road race staged in the Southwest this fall; but this desert classic will not be a revival of the Cactus Derby, the famous Los Angeles-to-Phoenix contest. It is to be a race over the Arrowhead trail from Los Angeles to Salt Lake City.

There are already three entries promised for this race from Los Angeles and Motor Age is making the first announcement of the contest. As soon as it is known that such a race is to be held, undoubtedly there will be many entries come in.

The race is to be promoted by the Arrowhead Trail Association under the rules and with the sanction of the contest board of the A. A. A. It is planned to have two night controls. The first at Las Vegas, Nev., and the second at St. George, Utah. From St. George to Salt Lake, it is intended to limit the drivers to a safe pace on account of the great number of children along the Utah state highway.

After the race finishes, there are to be

speed trials and short races on the Salt beds out of Salt Lake. These will also be under A. A. A. sanction and the events will be officially timed.

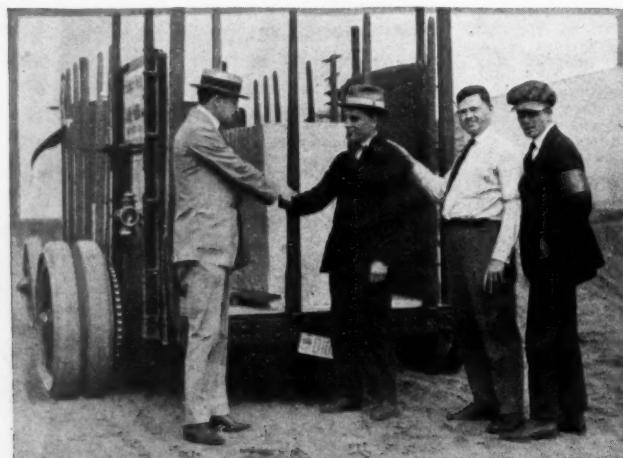
October 10 is the date upon which the promoters intend to stage the race and Al. G. Waddell, representative of the contest board in southern California, has been asked to reserve October 10-11 and 12 for the road race and October 13 for the speed trials and races on the salt beds.

It is intended to offer \$5,000 first money in the 3-day road race. There is to be a "Howdy Special," which has always been a feature of the Phoenix road race, run over the Salt Lake and the railroad almost follows the course of the desert racers over the scenic desert highway.

In August, there is to be an A. A. A. tour over the Arrowhead trail officially to dedicate this route which has been reclaimed. A part of the Arrowhead trail is the Old Mormon trail, used many years ago by the early Mormon pioneers in freighting down to the National Old Trails route or to southern California.

ANOTHER COAST TRUCK CONTEST

Los Angeles, Cal., July 21—California is to have another commercial car contest. The Motor Truck Dealers' Association of Los Angeles, has asked the contest board of the A. A. A. for a sanction to cover October 21 and 22. The run in October is to be over a much harder course than any ever selected for a commercial car run.



G. M. C. truck with which Harry Hurd made perfect score in Los Angeles-San Diego commercial vehicle run last week



Above—12,000 Doane truck and its load in Los Angeles-San Diego run. It made a perfect score. In oval—Studebaker truck being checked between grades

Every road condition to be encountered in southern California or the entire west, for that matter, is to be found on the route of the Desert Ramble, the name given to the truck contest.

Leaving Los Angeles at an early hour, October 21, the trucks are to run out over the boulevard to the edge of the desert and then over to Palmdale, thence to Victorville and Barstow, where the first night control will be. The second day's run is to be from Barstow to San Bernardino, returning to Los Angeles.

Tourists Reach Medora

Yellowstone Cavalcade Over National Parks Highway at Bridge Dedication

Twenty Cars Are Making Trip Which Covers 9 Days

MEDORA, N. D., July 25—Special telegram—Twenty carloads of motorists, representing nearly as many states, spent yesterday here. It was one of the most unusual sights most of them ever witnessed for a typical wild west roundup with broncho-busting acts was staged by real cow-boys. The party was the sociability tour which left Saint Paul July 20, bound for the Gardiner entrance to Yellowstone park over the National Parks highway.

The event, which the cow-boy stunts commemorates, was the dedication of the \$18,000 motor bridge over the Little Missouri river. This bridge completes the last link of this transcontinental motor passageway. The first 5 days of this sociability tour, unique in the annals of American motoring, have been delightful. Participants vote it a wonderful tour from every standpoint and the highways over which it has passed have proven their worth. In fact, entrants declared that it has paved a new way for motor travel to the Pacific coast. Hazen J. Titus, the originator of

the great big baked potato, famous in the Northwest, has been in charge of the hotel train operated by the Northern Pacific railway. Only the highest praise has been accorded this train for its extraordinary culinary department. Governor T. B. Hanna, wife and entire family are members of the party which will reach Yellowstone park Friday noon.

Mrs. F. H. Sheldon, of Minneapolis, is the only woman driver, and so far as is known is the first feminine pilot to enter and drive her own car in an organized motor tour of any great distance. Two more cars will be added at Beach, N. D., these

being machines of Hugh Egan and James G. Burke. No penalties are meted out in this tour. But Mr. Titus has offered to present one 150-pound cake, one 50-pound cake, and one 25-pound cake, to the entrants who carry the largest number of persons the greatest distance. The motorist who drives the farthest to enter, and the owner of the car which has the least tire trouble.

MILWAUKEE BOOSTER TOUR REPEATS

Milwaukee, Wis., July 22—The Milwaukee Automobile Dealers, Inc., this week completed the work of mapping out the route of the second annual booster tour, a 5-day sociability run which has as its primary object the promotion of publicity for the big motor show to be conducted by the M. A. D. in connection with the Wisconsin state fair.

The tour this year will start August 28, and continue until September 1, as at present outlined. The route is now being scheduled from data obtained this week.

COLORADO GOOD-ROADS RUN

Denver, Colo., July 21—A good-roads run of 110 cars was made Wednesday from Elizabeth to Denver, 40 miles, by between 500 and 600 enthusiastic motorists from Elbert county. The event was for sociability, business acquaintance and co-operation in a movement to improve the Denver-Parker-Elizabeth-Kiowa road and to extend this road on southeast to Limon, 90 miles from Denver. Limon is an important point in transcontinental travel, being where the Midland trail, Golden Belt road, Kansas Red Line and Kansas White Way from Kansas City and the Rock

Championship Standings

Resta Leads Field by Wide Margin for Bosch and Goodrich Prizes

Ralph dePalma Is Second with Rickenbacher Running Third

NEW YORK, July 21—The 150-mile race at Omaha July 15 was the sixth event selected by the contest board of the American Automobile Association to count in its designation of the 1916 champion race driver.

Dario Resta now leads his nearest competitor, de Palma, by 730 points and Eddie Rickenbacher is third, 900 points behind de Palma. The exact standing of competitors follows:

DRIVER	POINTS
Dario Resta.....	2,400
Ralph de Palma.....	1,670
E. V. Rickenbacher.....	770
Ralph Mulford.....	595
J. Christiaens.....	540
W. D'Alene.....	510
Pete Henderson.....	432
J. Devigne.....	320
John Aitken.....	320
Thomas Milton.....	260
Ira Vail.....	220
E. O'Donnell.....	185
Dave Lewis.....	110
F. Galvin.....	100
C. J. Devlin.....	90
R. Oldfield.....	80
Mel Stringer.....	55
George Adams.....	55
Earl Cooper.....	55
H. Wilcox.....	40
Billy Chandler.....	40
Bert Watson.....	35
M. Sorenson.....	35
Charles Johnson.....	30
Jack Gable.....	30
F. McCarthy.....	25
Ora Haibe.....	20
W. J. Muller.....	20

In addition to the official title of champion a trophy and \$3,500 in cash has been offered by the Bosch Magneto Co. and \$10,-

000 in cash by the B. F. Goodrich Co. to the drivers finishing first, second and third in the A. A. A. standing.

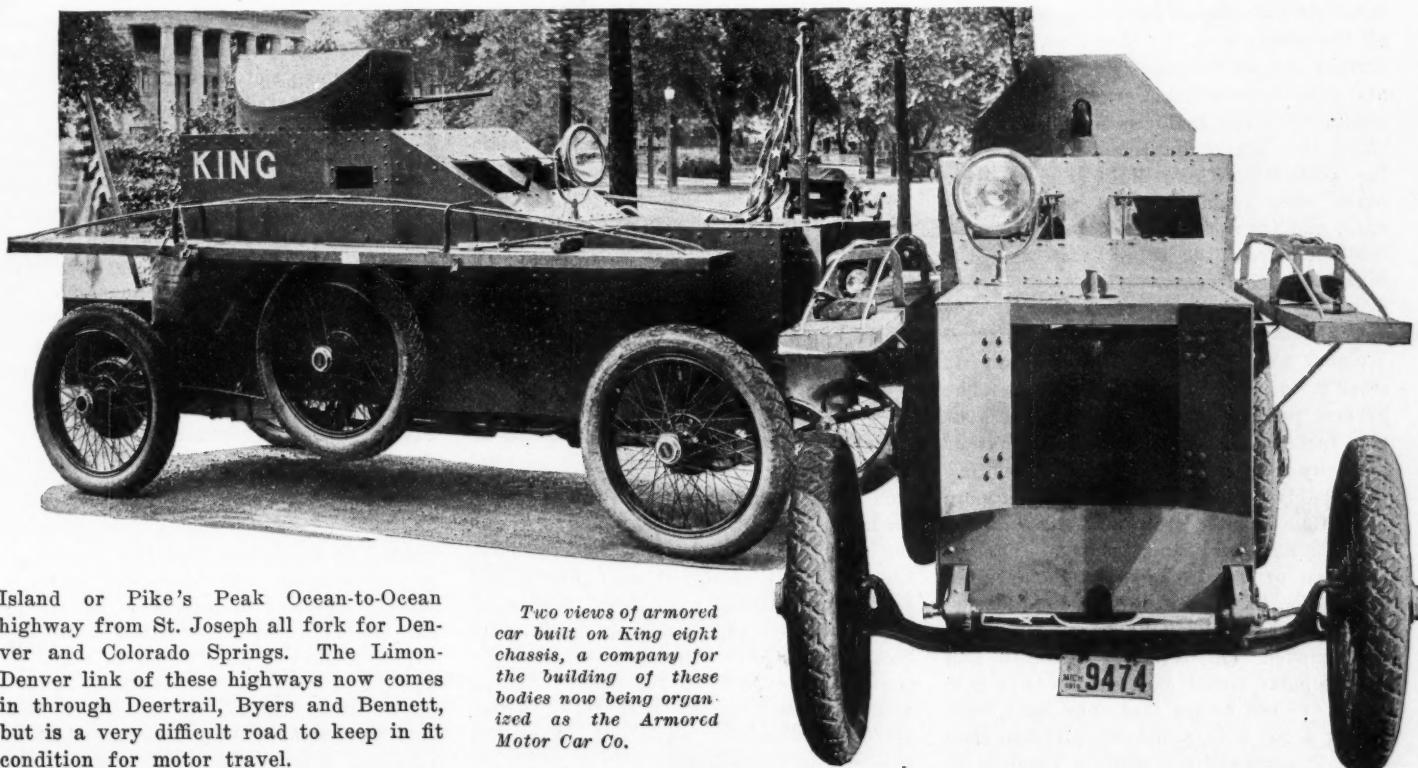
STROMBERG FINANCIAL EXPANSION

Albany, N. Y., July 22—A charter has been granted to the Stromberg Carburetor Co. of America, under the control of Allan A. Ryan & Co., and a syndicate of prominent banking interests in New York which recently incorporated the Stutz Motor Car Co. The directorate of the new company includes William Rand, E. F. Meniken and K. R. Howard, the first two being connected with the law firm of Jerome, Rand & Kresel, 37 Wall street, New York.

The company has issued 50,000 shares of no par value and will do business with \$250,000. The stock has been listed on the New York curb and was traded last Thursday on a "when issued" basis. On the turnover of 1,500 shares in this issue all but 100 shares changed hands at the subscription price of 42. Before the close of trading it was announced that the stock had been oversubscribed. It is stated that there probably will be no change in the management of the Stromberg factory but that the capacity of the plant will be doubled.

MOTOR CAMP FOR TRACTOR SHOW

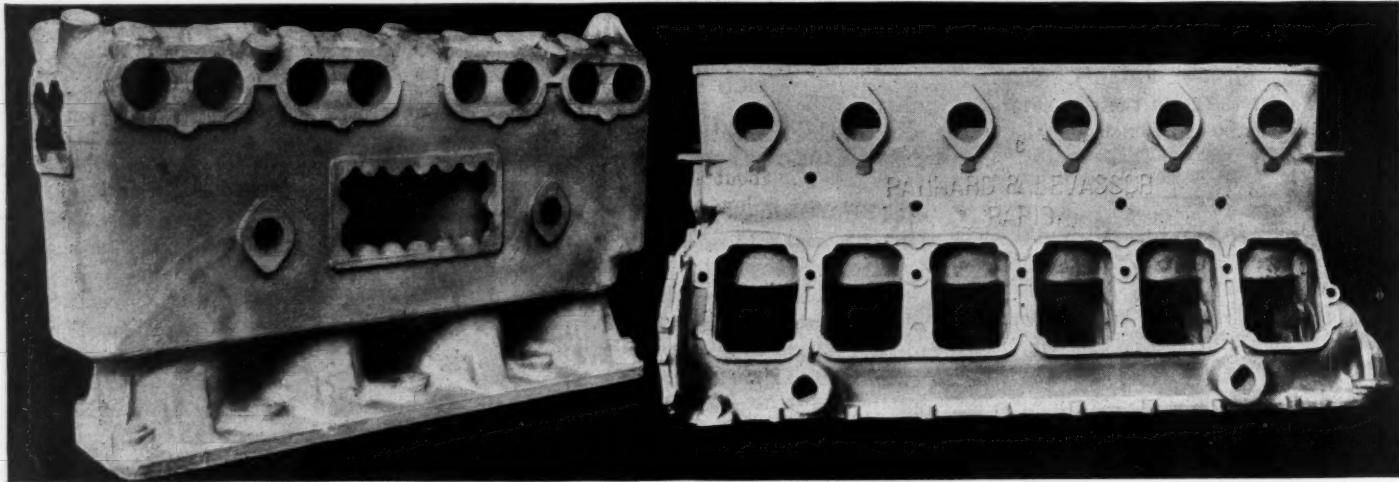
St. Louis, Mo., July 24—A site for camping parties has been laid out on the ground reserved for the Farm Tractor show here August 1 to 4—open to all visitors bringing camping materials. Water and other conveniences at hand. Practically all of the state agricultural and road officials will be present during the 4 days. Sufficient land has been acquired for the exhibit to insure all exhibitors space for private demonstrations.



Island or Pike's Peak Ocean-to-Ocean highway from St. Joseph all fork for Denver and Colorado Springs. The Limon-Denver link of these highways now comes in through Deertrail, Byers and Bennett, but is a very difficult road to keep in fit condition for motor travel.

Two views of armored car built on King eight chassis, a company for the building of these bodies now being organized as the Armored Motor Car Co.

American Adoption of Aluminum Piston Has No Counterpart



Exposed side of Peugeot racing motor, which is of aluminum alloy

Exhaust side of Panhard-Levassor Knight motor in aluminum alloy

European Manufacturers Have Not Used This Lightening Process, Though Idea Was Born Abroad

THE general adoption of the aluminum piston, which has been such a remarkable feature of the American motor car industry, has had no counterpart in Europe. This is all the more surprising when it is remembered that the initial experimental work was done in France and Germany, and that the Cothias process of aluminum die casting was extensively employed in France as far back as 1897 for a variety of small mechanical parts.

Europeans Make Experiments

Six or seven years ago, when the question of motor efficiency was beginning to receive close attention, experiments were made with aluminum pistons by practically all European firms. At that time, however, certain details remained to be perfected, and after tests which were not completely satisfactory the factories one by one decided that aluminum was not practicable for pistons. Where light reciprocating parts were required, steel pistons were used, and for racing purposes steel pistons machined from the solid billet were the invariable equipment. The only French firm having plumped unhesitatingly for the aluminum piston is the Chenard & Walcker Co., who has used it on all its stock motors for the last 4 or 5 years. The general public, however, is not aware of this fact; and so small is the amount of publicity concerning aluminum pistons that it probably would have done the firm more harm than good to state that the ordinary methods had been departed from. For the last two or three years the Panhard-Levassor Co., has made use of aluminum pistons on a little 10-12 horsepower, poppet-valve model. This is a very successful and very popular model, but even dealers generally are not aware that they have been selling a car with aluminum pistons. The D. F. P. company has made a practice of

fitting its sporting type models with aluminum alloy pistons, again without informing the public of this fact.

In Italy the general situation has been similar to that of France. All the Italian factories experimented with aluminum alloy pistons, but with the exception of the comparatively little-known Chiribiri company of Turin, not one firm adopted them for stock models. The Aquila-Italiana Co. did much experimenting, but does not appear to have been decided about the complete adoption of aluminum alloy pistons. The Fiat company, which maintains its own aluminum foundry, is also much interested in this question. They have used aluminum alloy pistons on their racing cars, particularly on the three machines which ran in the last French Grand Prix at Lyons. These cars had engine trouble, but the pistons stood up in a very satisfactory manner. Aluminum alloy pistons are also employed exclusively on Fiat aviation motors—and this firm is the biggest aviation motor producer in Italy. For stock models the firm appears to be hesitating. For some of the latest models experimental cars were given hard running on the road for a full year in order to get a definite opinion as to the value of aluminum, without, however, so far as can be learned, a decisive result being arrived at.

No important European races have been won with aluminum pistons. Peugeot, who during the last 5 years has done more racing than any half dozen firms combined, has invariably employed steel pistons and been fully satisfied with them. The same applies to Delage. Sunbeam, until quite recently, has been satisfied with steel pistons machined out of the solid. At the annual Monaco motor boat races, where much experimental work was seen, the steel piston was supreme.

Since the outbreak of the war, with the requirement of large numbers of high-efficiency aviation motors, manufacturers have been led to reconsider the claims of aluminum pistons and in many cases have taken up the type of piston they cast aside 6 or 7 years ago. Quite recently the Le Rhone aviation motor company—now combined with the Gnome company—produced a new aviation motor from which 120 horsepower was obtained. The result was not considered satisfactory and the cast iron pistons were changed for Cothias die-cast aluminum alloy pistons, when the power was increased to 150 horsepower. No other changes were made in the motor. As a result the whole of this series of motors will have aluminum alloy pistons and many of the Gnome motors, with steel cylinders, will also be fitted in the same way. The Lorraine-Dietrich Co. has had a similar experience. After using cast iron pistons in an eight steel cylinder water-cooled aviation motor, it got better results with aluminum and completely adopted Cothias die-cast pistons. These pistons are deeply ribbed from the head to the skirt. The Cothias pistons are known in America as Lynite, the Cothias rights having been acquired by the Aluminum Castings Company, of Cleveland.

Predict Use of Aluminum Pistons

Among other firms now making use of aluminum alloy pistons, either completely or partially, are Peugeot and Hispano-Suiza. It is certain that the outcome of present aviation experience will be an extensive adoption of aluminum pistons for car motors. Not a few firms have been experimenting in this direction while the war is in progress, but without making known their results. It is certain, however, that firms will not be rushed into the adoption of aluminum alloy pistons. One

factory ran a set of pistons 60,000 miles without dismounting before being convinced. Another put three cars on the road and ran them 12 hours a day for a full year in order to be sure that the change from iron to aluminum was a wise policy.

Aluminum cylinders also have come to the front during the war period. There is no stock car on the European market fitted with aluminum alloy cylinders, but it would appear that the first commercial adoption of this type of cylinder was made by the Hispano-Suiza Co., Paris and Barcelona. Engineer Birkigt, of this company, 2 years ago produced an eight-cylinder V-motor with each set of four cylinders forming a single aluminum alloy casting, into which thin steel liners were screwed. The head was detachable and of cast iron. It carried the vertical valves operated by overhead camshaft. Several patents have been obtained covering the methods of constructing this motor, particularly the system of screwing the liners into the aluminum cylinders and the valve operating mechanism. The aluminum cylinders are enameled inside and out to guard against any possible porosity of the metal, and the final finish of the outside of the cylinder is a fine black enamel. This motor has been produced in series for a full year and has been most successful. Before its construction was decided on in big quantities it went through 50 hour full load official brake tests. Weight of this motor is 2.4 pounds per horsepower without water or oil. Its consumption of gasoline and lubricating oil is very moderate.

Panhard-Levassor Uses Aluminum Motor

The Panhard-Levassor Co. has been running an aluminum cylinder motor, driving factory machinery, for 22½ hours a day, 7 days a week, for a full year. This motor has no cylinder liners, but the valve seats and head are of cast iron. Although this motor ran constantly for 365 consecutive days, with the exception of the 1½ hours each day the factory was shut down for meals, no troubles have developed.

The same firm has had on the road during the past year a number of cars with Knight motors, fitted with aluminum alloy cylinders without liners. These cylinder castings weigh 46 pounds. In iron the weight is 115 pounds. One of the most interesting examples is a big six-cylinder block-cast Knight motor with cylinders and upper half of crankcase forming one casting of aluminum alloy. This motor, has sleeves operating direct on the aluminum walls, and weighs only 202 pounds rough from the foundry. Completely machined, the weight is reduced to 145 pounds. A similar casting in iron weighs 510 pounds, rough from the foundry, and 375 pounds completely machined. Several of these big motors are in service, with good results so far.

Another important aluminum cylinder motor is a four-cylinder ten-valve Peugeot racing type, shown in one of the illustrations. This motor has neither cylinder

liners nor separate valve seats. In its general design this motor is exactly similar to the racing engines used by Peugeot on the 1914 Grand Prix racers now in America. The casting shown in the illustration weighs 63 pounds in the rough—that is before any machining has been done. The cylinders are approximately 3.7 inches bore. The same rough casting in iron weighs 170 pounds. On an eight-cylinder engine there is a saving of about 200 pounds by the use of aluminum alloy in place of cast-iron cylinders. These motors are a high-efficiency type running normally at 2,800 revolutions. Several of them are in service.

Another aluminum cylinder motor is a 12-cylinder horizontal with cylinders cast in groups of six pistons and valves operating direct on the aluminum. Another make is a six-cylinder vertical with superimposed valves in the head, also without cylinder liners or separate valve seats. It is obvious that the use of aluminum cylinders for cylinder castings is of the greatest importance to aviation motor manufacturers. By this means only has it been possible to get the weight of fixed cylinder motors down to the low figure of such engines as the Gnome, which are practically all steel machined out of the solid. The V-type aluminum cylinder motor costs considerably less to produce than the rotary Gnome type, and is much easier to assemble and keep in condition. While the two types are about equal in weight on the scales, the V-motor has a decided advantage when account is taken of gasoline and oil required for a long period of running.

European firms are studying after-the-war models while fighting is in progress. It is too early to say what these models

will be like, but it is practically certain that aluminum alloy will replace cast iron for the cylinders of the bigger touring car engines. What may be expected is the appearance first of Knight motors with aluminum alloy cylinders, followed later by poppet valve engines in the same metal.

A development which does not appear to have received the same amount of attention in America as in Europe is the use of aluminum for brake shoes. These are very common on both trucks and touring cars by the leading French makers. With the tendency towards unit construction of motor and gearbox, both brakes have to go on the rear wheels. European ideas will not admit of internal and external brakes on even the cheaper classes of cars, thus the shoes are placed side by side within big diameter drums. Here the use of aluminum enables an appreciable saving of weight to be effected. Panhard-Levassor cars are a good example of this. The rear axle of all this firm's models has an aluminum differential housing, and the big diameter brake shoes are an aluminum die casting. Peugeot is another firm making use of aluminum shoes on both touring cars and trucks. Naturally these shoes are lined with Ferodo or similar material.

A pair of brake shoes 13.7 inches in diameter by 1.5 inches wide, weigh 2.3 pounds; with Ferodo lining, rivets, bushes, etc., the total weight of the pair of shoes is 4.8 pounds, or 9.6 pounds for the two wheels. These weights and dimensions are those of the Sizaire-Berwick car. With both sets of brakes on the rear wheels, the weight of shoes and lining, etc., in aluminum is 19.2 pounds, compared with 33 pounds with lined cast iron shoes.

Paris Motorbuses Are Re-established Were Out of Service for 22 Months

PARIS, July 6—Twenty-two months after withdrawal on account of the war, the Paris motorbus service has been partially re-established with a single route served by thirteen buses running on a 5-minute schedule. The established line is over the main boulevards from the Madeleine to the Bastille.

Interest attaches to these buses by reason of the good service they have performed in the war, and the modifications which have been carried out on the new models as the result of war experience. It was an old-standing arrangement that in case of mobilization the whole of the motorbuses of Paris should be equipped with special meat-carrying bodies or with lighter bodies for the transportation of troops. The parts necessary to modify the buses were kept in stock, so that within 48 hours the Paris motorbuses were transferred from civilian to war service.

Several attempts have been made by the bus company to re-establish its service, but on every occasion the vehicles were requi-

sitioned by the army as soon as completed. It may be taken that the army now has sufficient supplies, for the last batch of thirteen has been allowed to go on the streets, an assurance having been given that they will not be taken over by the military. There is no intention of resuming the whole of the Paris service while the military situation remains as at present. Before the war Paris got its motorbuses from the De Dion Bouton and the Schneider factories, the bus company making most of its own bodies and its own road wheels.

Lately the company has shown a desire to build its own vehicles, although being dependent on the De Dion-Bouton and other factories for many components. There is an impression that the company will eventually follow the example of London and build entirely in their own shops. The single-decker type of bus, carrying 35 passengers, with driver placed above the motor, has been maintained as the most suitable for Paris conditions.

Dallas Tractor Demonstration Extensive

Visitors Flock to Meet in Big Numbers—
75,000 Witness First Showing

DALLAS, July 21—What is undoubtedly the greatest aggregation of gasoline and kerosene farm tractors that has ever been brought together will describe in a few words the first National Tractor Demonstration which was formally opened on Tuesday of this week and which was brought to a close on Friday night. The attendance was 75,000.

Not all these visitors were farmers. A large percentage of them were motor car dealers, garagemen and repairshop men from all over the state of Texas. In fact, in a notable number of instances, these men came from Oklahoma and from Arkansas to see their first public demonstration of power farming engines and implements that most of them believe are to play such an important part in their lives in the very near future.

Attendance Surprises

The farmers of Texas have flocked to the demonstration in numbers that have truly astounded those who expected a big attendance. It was predicted that the first demonstration on the circuit might perhaps equal in attention-compelling value the demonstration at Fremont, Neb., last year, which was the largest held in 1915. But that the attendance already has exceeded Fremont has been established. The traction lines have been hard put to it to accommodate the visitors and the hotels are crowded to overflowing.

It is a significant fact that dealers and garagemen are taking such great interest in the demonstration. While manufacturers of tractors are plainly uneasy in their minds as to who ultimately will handle

the tractor—motor car dealer or implement man—there seems no doubt but that the tractor maker will have to look to the garagemen for his service.

During the week a large number of contracts have been signed and though few manufacturers care to make public the names of new dealers and distributors, they have no hesitancy in saying that wherever it is possible they invariably prefer to do business with the motor car dealer or the garageman.

The demonstrations this year are being run in an entirely different manner from those of years gone by. The competitive spirit is entirely lacking and instead the whole affair is a demonstration in the purest sense of the word.

As an exhibition it is not unlike a great motor car show except that in every instance all the tractors are operating on gasoline and kerosene.

Each day the machines are started running about 8 o'clock in the morning and few of them are stopped, except occasionally to replenish fuel, until 6 at night. Even during the plowing demonstrations the exhibition machines are permitted to run, often without attendance of any kind.

Heat Intense; No Steam

In this respect, it is a tribute to their designers that in spite of the terrific heat, which during the first part of the week was as high as 103 degrees, none of the machines evidenced any inclination to steam. Motor cars of all makes were spouting steam all around them.

The public demonstration is started each day promptly at 1 p. m. At 12:15 all of the tractors leave their respective tents, and, towing the implements that will be demonstrated, make a great, noisy proces-

sion to the demonstration field which is perhaps $\frac{1}{2}$ mile from the tents.

The demonstration is being held on what is known as the Caruth farm, a great tract of land giving about 1,200 to 1,500 acres on which to handle the tractors. Each tractor manufacturer has allotted to him each day a strip of land, the size of the strip being proportioned to the size of the tractor to be demonstrated and the number of plow bottoms he will pull.

Every tractor operator must start his machine at a given signal and continue to plow until all his land has been finished. This, of course, promotes some friendly rivalry between the various companies but this is the only spirit of competition there is.

Fuel Optional

With regard to the fuel that is used, no restriction is placed on the kind. A maker may use either gasoline, kerosene or distillate, though up to today only one maker has been doing any plowing with the latter. But each maker must procure his fuel from a designated source so that there may be no doubt of its gravity.

Most of the machines in use have been burning kerosene. On the first day, when there were some forty-four machines on the field at the same time, twenty-seven of them were operating on kerosene as against seventeen operating on gasoline.

The fuel problem does not appear to worry the farmer greatly in Texas. Gasoline is at present selling for 19 cents per gallon but he can get kerosene from 7 to 10 cents. Even those manufacturers who have been plowing with gasoline, however, are preparing to plow on subsequent days with kerosene and those that cannot now do so are perfecting kerosene burning attachments and will equip with them at the request of the purchaser.

The demonstration is a liberal education to the farmer in the work that can be done with a tractor. True, many of those who have come to the demonstration already are tractor users but by far the majority do not own them. Most of them are at least in part familiar with the gasoline engine for there are few farmers in the state who have no motor car. The city of Dallas alone has more than 16,000 cars.

The accessory exhibit is one of the most interesting tents on the grounds. That there is a market and a big one for accessories there can be no doubt for from the engine back to the transmission gear there is not a great deal of difference between the tractor and the motor car. The tractor will use spark plugs, wire, petcocks, greases and oils, water hose, piston rings and a hundred and one other things that some one eventually—nay, even



Smith Form-a-Truck attachment used with Ford chassis to make a 1-ton truck and employed by the machine gun company of the eighth infantry, Massachusetts volunteers, now on duty in the vicinity of El Paso, Tex. A similar job is completed for the national guard of Illinois, Florida and several other states

right now—must be prepared to sell the tractor user. Naturally, the tractor user is looking to his garageman for such supplies and it is almost a foregone conclusion that he will continue to do so.

I. C. TO PROTECT CROSSINGS

Bloomington, Ill., July 25—Hedges, trees that hide the tracks, and stand as a constant menace to motorists on public highways; high grades, where motors are likely to stall at the moment which might mean death; buildings which set too close to the tracks, and all other items working towards danger for the general public at railroad grade crossings, will feel the weight of the Illinois Central official hand, following a special inspection completed by the management this week, designed to promote safety and reduce the number of crossings accidents. Every crossing which has been the scene of an accident, and others which are regarded as dangerous, will be listed and steps taken to prevent a recurrence.

KANSAS TRACTOR DEMONSTRATION

Hutchinson, Kan., July 25—Special telegram—The second tractor demonstration of the season opened today at Hutchinson. The program is similar to that at Dallas and there are fifteen tractor makers exhibiting here that did not appear at the Texas demonstration last week. However, many exhibitors who were at Dallas did not come to Hutchinson.

Whereas, practically all machines pulled disk plows in Dallas, most of them will pull mold-board plows here because of the difference in soil. It has been very dry here, there being no rain for upward of a month. This makes very hard plowing and is an excellent test of the ability of the tractors. The accessory exhibit here is much larger than in Dallas.

TO MAKE TRACTOR CULTIVATOR

The Illinois Silo Co., Bloomington, Ill., has commenced the manufacture of a new tractor cultivator, patented by W. M. Springer, who for 25 years was a designer of the Avery Mfg. Co., Peoria, Ill., and who will be in charge of the plant. The various sections of the tractor will be cast at various foundries and the finished parts assembled. The inventor claims to have the first tractor cultivator on the market. The inventor claims his machine will fit into the niche in the general farm work, which a recent bulletin by the government agriculture department asserts was left vacant by the larger and heavier tractors, the limitations of which makes them unprofitable during a large portion of the year. The Springer machine will operate with any kind of gasoline or kerosene motor of more than 4 horsepower, it is said. The tractor complete with its motor weighs from 2,100 to 2,400 pounds. The frame is adjustable, so that it can be fitted to plows, cultivators, rakes, etc.

Kelsey Wheel Companies Consolidate

New Concern Has Capital Stock of \$13,000,000

Expansion Is Probable

DETROIT, Mich., July 22—The consolidation of the Kelsey Wheel Co., with plants at Detroit and Memphis, Tenn.; the Kelsey Wheel Co., of Windsor, Ont., and the Herbert Mfg. Co., Detroit, practically has been completed, the new corporation to be known as the Kelsey Wheel Co., Inc., with a capital stock of \$13,000,000, composed of \$3,000,000 of 7 per cent accumulative preferred stock and \$10,000,000 of common stock.

John Kelsey is to become president of the new corporation, but the rest of the officers have not yet been determined. Control of the new organization will remain with Mr. Kelsey, and the others already associated with him in the several companies entering the merger. Mr. Kelsey is the leading figure both in the several companies above mentioned and it is largely due to his genius that these enterprises have grown to their present great size.

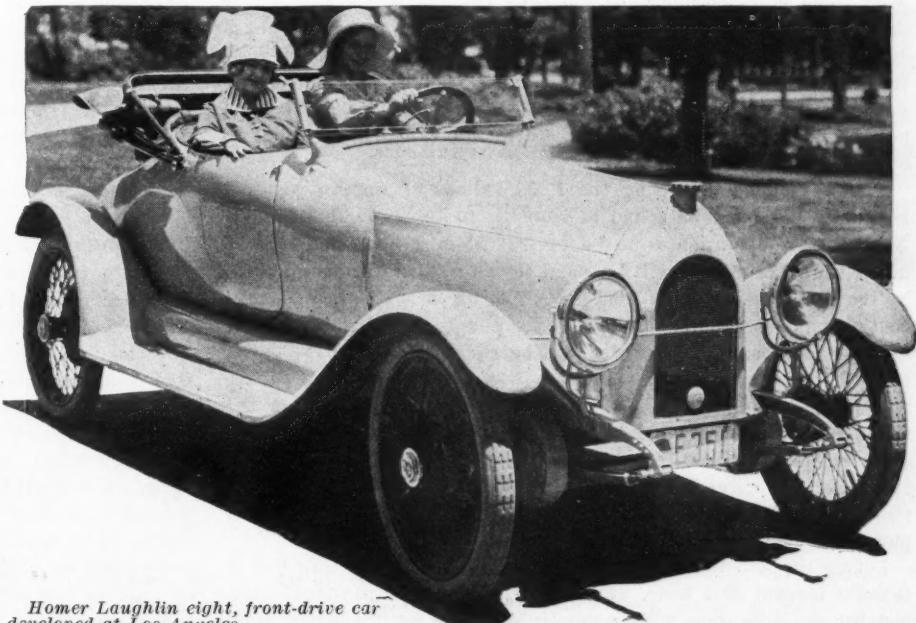
Few realize the size of the Kelsey interests, both here and in the South. At the main Kelsey plant in this city, twenty-five sets of wood wheels are produced daily, complete with rims. In the making of motor car rims the Kelsey company now ranks at the top and utilizes 150 tons of steel per day for this product alone. The Herbert Mfg. Co. makes 500 bodies per day, besides finishing and trimming a large proportion of them. This plant is also a very large producer of a variety of steel stampings required in the manufacture of motor vehicles. The Memphis, Tenn., plant of the Kelsey company represents an investment of \$500,000 and is the factory at which the hickory used in the manufacture of the wheels is concentrated. It is

here worked into spokes and felloes, the completed wood wheels then being sent to Detroit where they receive their steel rims. The Kelsey company located in Windsor, Ont., is a separate corporation, but includes most of the same stockholders. It is the Canadian car manufacturers' main source of wheel supply. The Detroit Kelsey company has an authorized capital stock of \$1,500,000, all of one class, and \$900,000 of this is outstanding.

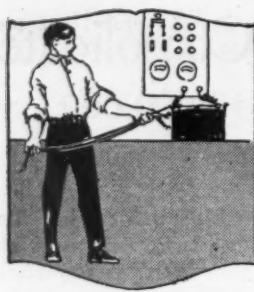
The preferred stock of the Kelsey combination is underwritten by Sachs, Goldman & Co., New York bankers, and the common is said to have been oversubscribed. In the organization plan there is provision for retiring to preferred stock at the rate of \$90,000 per year. It is proposed to make the consolidation effective from January 1, 1917.

MAKE FRONT-DRIVE CAR

Los Angeles, Cal., July 25—The distinction of manufacturing the first front-drive passenger car is claimed by Los Angeles, Cal. A home product throughout, the initial Homer Laughlin eight is just from the factory of the Homer Laughlin Engineers' Corp., which has devoted 2 years to perfecting the car. It is claimed by the manufacturers that the front drive eliminates skidding, provides ability to negotiate difficult places, and overcome obstacles beyond the capacity of rear-driven cars. The Laughlin machine is covered by five patents. During the next 6 months the factory will turn out two cars daily, according to announcement, and within a year the output will be increased to five a day.

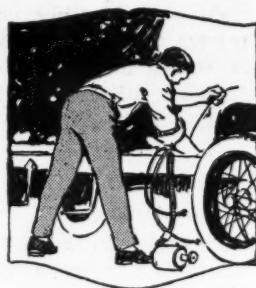


Homer Laughlin eight, front-drive car developed at Los Angeles



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.



Editor's Note— Herewith is presented the fifth installment of a weekly series of articles which began in *Motor Age*, issue of June 29, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. The information it is planned to offer in this series will be equally valuable to the repairman, whether he be skilled in things electrical or have a very limited acquaintance with them. For the sake of the majority of readers, whose real knowledge of electricity is more general than definite, it has been thought wise to begin with the very first principles of electrical phenomena, in order that owners may be able to follow the circuits on the electrical systems of their cars with the certainty that they are right. To the lay reader, the first few installments of this series are the most important, for without them, wiring diagrams, trouble charts and repairing instructions are almost useless; with the groundwork well laid by study of the early portion of the series, the reader will be able to think electrically, and a tangle of wire under a car or a tangle of lines on a wiring diagram will become clear.

The first element in the thorough understanding of electrical apparatus is the idea of the circuit. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the Class Journal Co., Chicago, in a size to fit the pocket conveniently.

WHAT HAS GONE BEFORE

In preceding installments of this series which appears weekly, beginning in the issue of *Motor Age* for June 29, the principle of the electric circuit was brought out. The circuit is the basis of the many applications of electricity to the motor car, and, in order to understand the operation and maintenance of these applications, it is essential that we have a thorough knowledge of the electrical circuit and its more common characteristics. In developing the idea of the electrical circuit its analogy to water systems is used. In electrical installations the circuit must be complete for a current of electricity to flow, and the path of the current is without beginning or end like a circle is without beginning or end. The working form of the electrical circuit and the measurement of power and torque are explained this week.

Part V—Electrical Power

POWER is the rate of doing work, that is, it is the work done in a given time divided by the time. When the rate of doing work is 33,000 foot-pounds per minute the power is equal to 1 horsepower. This rate of 33,000 foot-pounds per minute is the same as 550 foot-pounds per second, hence, if the rate of doing work is 550 foot-pounds per second, the power is equal to 1 horsepower.

In the preceding chapter, we found that there was 5,000 foot-pounds of work done in raising 100 pounds of material from one floor of a building to another floor 50 feet above the first. The work done is independent of the time but the power required is dependent upon the time it takes to do the work. Thus, if it takes 10 seconds for the hoisting machine to raise the 100 pounds 50 feet, the work done per second will be equal to $5,000 \div 10$, or 500 foot-pounds per second. Now, since 1 horsepower is 550 foot-pounds per second, the horsepower in this particular case will be equal to $500 \div 550$ or $10/11$ horsepower.

The work done in raising the 1,200 gallons of water a vertical height of 100 feet was found to be equal to 1,000,000 foot-pounds. Now, if this operation is to be performed in 1 hour, the rate of doing work per minute will be equal to the total work done divided by the time in minutes, or $1,000,000 \div 60$, which is equal to 16,666.6 foot-pounds per minute. The power the pump is developing in order to raise this quantity of water will be equal to $16,666.6 \div 33,000$, or .505 + horsepower. This is the power actually required to lift the water and does not take into account any power lost in the resistance of the pipe due to bends, etc. The power required to drive the pump will be greater than the power the pump develops, as part of the power is lost within the pump itself; hence, the horsepower of an electric motor which may be used in operating this pump must be quite a bit greater than .505 horsepower.

Let us suppose that this quantity of water is to be raised in 2 minutes instead of 1 hour, what horsepower will be required? Remember the work done will be exactly the same but the power must

be greater as the same work is to be done in a less time in this case than in the previous case. The rate of doing work in this case is equal to $1,000,000 \div 2$, or 500,000 foot-pounds per minute. This rate of doing work divided by 33,000 gives the horsepower, which will be equal to 15.15 horsepower. It is obvious that the value of the horsepower required to perform a certain operation will increase as the time of doing the work increases.

The work done in raising a car weighing 5,000 pounds a vertical height of 50 feet we found to be equal to 250,000 foot-pounds. If this operation is to be performed in 2 minutes, the rate of doing work will be equal to $250,000 \div 2$, or 125,000 foot-pounds per minute. The horsepower required will be equal to $125,000 \div 33,000$, or 3.78 horsepower. This is the horsepower actually required to raise the car and does not take into account any power required to take care of the friction of the elevating device. If the car were to be raised in 30 seconds or $\frac{1}{2}$ minute, the rate of doing work would be equal to $125,000 \div \frac{1}{2}$, or 250,000 foot-pounds per minute. The horsepower in this case then is equal to $250,000 \div 33,000$, or 7.57 horsepower.

The work done in drawing the disabled car along the street, we found to be equal to 1,056,000 foot-pounds when the pull in the tow rope was 100 pounds and the car was pulled a distance of 2 miles. Let us suppose this operation is performed in 15 minutes. The rate of doing work will be equal to $1,056,000 \div 15$, or 70,400 foot-pounds per minute. The horsepower is equal to $70,400 \div 33,000$, or 2.13 horsepower.

Electrical power is the rate of doing electrical work, that is, it is the electrical work done in a given time divided by the time. When the rate of doing electrical work is equal to 1 joule per second the power is equal to one watt.

The work done in charging a certain storage battery we found to be equal to 100,800 joules. The time required to do this amount of work in this particular case was 1 hour, or 3,600 seconds; hence the rate of doing work was $100,800 \div 3,600$, or 28 watts.

The work done in operating a certain starting motor we found to be equal to 126,000 joules. The time required to do this amount of work was 2 minutes or 120 seconds and the power is equal to $126,000 \div 120$, or 1,050 watts.

The power in any part of an electrical circuit may be determined by a more direct method than the one given above and this method may be developed as follows: In determining the work done we multiplied the current by the time in seconds in order to obtain the quantity of electricity passing through the circuit and this result was then multiplied by the value of the difference in electrical pressure or electrical level through which this quantity of electricity moved. This result may all be condensed to the following simple statement:

$$\begin{aligned} \text{Electrical work in joules} &= \text{current in amperes} \\ &\times \text{multiplied by time in seconds} \\ &\times \text{multiplied by} \\ &\quad \text{difference in electrical pressure in volts} \\ &\quad \text{joules} = \text{amperes} \times \text{seconds} \times \text{volts} \end{aligned}$$

The electrical power is equal to the electrical work divided by the time in seconds required to do the work. Hence, if the above expression for electrical work be divided by the time in seconds, we have the value of the power equal to the current in amperes, times the difference in electrical pressure in volts, or

$$\text{Watts} = \text{amperes} \times \text{volts}$$

The power required to charge the storage battery referred to above, then is equal to 4×7 , or 28 watts. Likewise the power required to operate the motor is equal to 150×7 , or 1,050 watts.

Measurement of Electrical Power

The power in an electrical circuit or any part of the circuit at any instant is equal to the product of the current in the circuit and the electrical pressure acting on the entire circuit or the part of the circuit in which it is desired to determine the power. For example, the current taken by a motor may be determined by connecting an ammeter in series with the motor as shown in Fig. 39, and the electrical pressure between the terminals of the motor may be determined by means of a voltmeter connected directly to the terminals. The product of the current, as indicated by the ammeter, and the pressure, as indicated by the voltmeter, will give the power taken by the motor.

The above method of measuring power is known as the voltmeter-ammeter method and it gives the value of the power when the circuit is carrying a direct current but does not necessarily do so when the circuit is carrying an alternating current as will be explained in the section dealing with the "Alternating-Current Circuit."

The power in a circuit carrying either direct or alternating current may be measured directly by means of an instrument called the wattmeter. The construction of this instrument is such that it combines the ammeter and voltmeter in one instrument and the indication of the power is direct without having to multiply current and voltage. The general scheme of connections of the wattmeter is shown in Fig. 40, in which the terminals A_1 and A_2 correspond to the ammeter connections and the terminals V_1 and V_2 correspond to the voltmeter connections.

Relation Between Mechanical and Electrical Power

The relation between the electrical power in watts and the mechanical horsepower has been determined experimentally and the results show that there are 746 watts in 1 horsepower. For example, if a generator is delivering a current of 15 amperes at a pressure

of 7 volts, the power in watts will be equal to the product of the current in amperes and the pressure in volts, or

$$\text{Power in watts} = 15 \times 7 = 105 \text{ watts}$$

The power in horsepower will be equal to the power in watts $\div 746$, or

$$\text{Horsepower} = 105 \div 746 = .14 \text{ horsepower or about } 1/7$$

The maximum current that a certain storage battery can safely deliver is 70 amperes and when this current is being taken from the battery the pressure between its terminals is 7 volts. What is the power output of the battery in watts and horsepower?

$$\text{Power in watts} = 70 \times 75 = 525$$

$$\text{Horsepower} = 525 \div 746 = .703$$

A generator delivers a maximum current of 20 amperes at a pressure of 12 volts and it has an efficiency of 80 per cent for this particular load. What horsepower will be required to operate this generator?

$$\text{The output of the generator} = 20 \times 12 = 240 \text{ watts.}$$

The statement that the generator has an efficiency of 60 per cent means that $60/100$, or $3/5$ of the power required to drive the generator, is in turn delivered by the generator to the circuit in which it is connected. The power delivered by the generator, or 240 watts, represents $3/5$ of the power required to operate the generator. One-fifth of the power required to operate the generator will be equal to $240 \div 3$, or 80 watts, and five fifths, or the entire power required to operate the generator, will be equal to 5×80 , or 400 watts. This power in watts divided by 746 gives the horsepower required to operate the generator, or

$$\text{Horsepower} = 400 \div 746 = .53 \text{ horsepower}$$

Since power is the rate of doing work, or the rate of the expenditure of energy, that is, it is equal to work done or the energy expended divided by the time, we can say that the energy is equal to the power multiplied by the time. There are a large number of different units for work or energy and some of the more common ones are as follows:

1 horsepower acting for 1 hour is called a horsepower-hour
1 watt acting for 1 second is called a watt-second

1,000 watts, or 1 kilowatt, acting for 1 hour is called a kilowatt-hour.

For example, if a generator requires 10 horsepower to operate it, what energy will be required to operate the generator for 5 hours. The energy in horsepower-hours will be equal to the product of the power in horsepower and the time in hours which is equal to 10 times 5, or 50 horsepower-hours.

If a starting motor takes a current of 100 amperes at a pressure of 6 volts, what energy in kilowatt-hours will be required to operate the motor for 2 hours? The power will be equal to

$$100 \times 6 = 600 \text{ watts,}$$

and the energy will be equal to $600 \times 2 = 1,200 \text{ watt-hours.}$

One kilowatt-hour is equal to 1,000 watt-hours, so to change a given number of watt-hours to kilowatt-hours, divide by 1,000. Then 1,200 watt-hours is equal to

$$1,200 \div 1,000 = 1.2 \text{ kilowatt-hours.}$$

Measurement of Electrical Energy

The electrical energy required to operate motors, lamps, heaters, etc., may be determined by multiplying the power by the time, provided the power remains constant throughout the entire time. This method of determining the value of the energy cannot be used, however, when the power in the circuit is fluctuating in value as in the case of a motor which is driving a variable load, such as would be found in the ordinary machine shop or in an electric car.

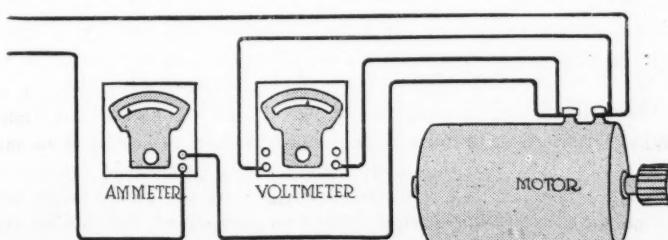


Fig. 39—Measuring power taken by a motor by means of an ammeter and a voltmeter

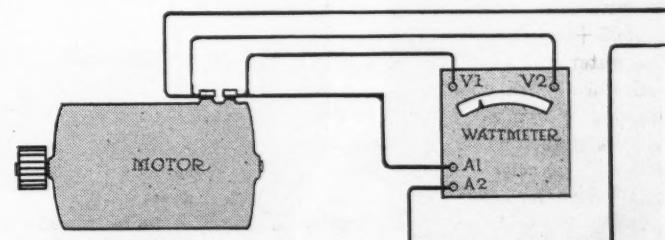


Fig. 40—Measuring power taken by a motor by means of a wattmeter

The energy in such a case can be determined by means of a watt-hour meter whose dial reading is proportional to the energy that passes through the circuit in which the meter is connected. Watt-hour meters are used by the electrical power companies in measuring energy supplied to their customers and the difference in the readings on the dials of these meters at certain intervals represents the energy used during the period between the times when the meter dials were read. Watt-hour meters are of numerous forms but they all measure energy. Remember that you do not buy electrical power, but electrical energy, and you usually pay a certain amount per kilowatt-hour.

Two typical forms of watt-hour meters are shown in Fig. 41.

How to Determine the Cost of Charging Storage Batteries

Let us assume that a 6-volt storage battery is to be charged at the rate of 5 amperes for 15 hours from a 115-volt circuit and that the average voltage of the battery during the charging operation is 7.0 volts. What will it cost to charge the battery if you have to pay 10 cents a kilowatt-hour for energy?

It will be necessary to place a bank of lamps or other resistance in series with the battery, as shown in Fig. 42, in order to prevent an excessive current flowing. The pressure acting on the resistance placed in series with the battery will be equal to the difference between the total pressure and the average pressure of the battery which is equal to 115 minus 7, or 108 volts. This pressure of 108 volts is to produce the current of 5 amperes through the series resistance; hence, the value of the resistance will be equal to $108 \div 5 = 21.6$ ohms.

In charging the battery, a large part of the total energy drawn from the circuit will be transformed into heat energy in the charging resistance and lost so far as the battery itself is concerned. The cost of all the energy drawn from the circuit, however, will have to be charged against the battery. The power in the charging circuit will be equal to $115 \times 5 = 575$ watts.

The energy input to the battery circuit during the 15 hours will be equal to the product of the power in watts and the time in hours which is equal to 575×15 , or 8,625 watt-hours.

Dividing the value of the energy in watt-hours by 1,000 gives 8.625 kilowatt-hours.

The cost of the energy will be equal to $8.625 \times \$0.10 = \0.86 . It is readily seen that the cost of charging a battery in the manner indicated above is almost prohibitive and it is due to the simple fact that such a large part of the total energy drawn from the charging circuit is used in the series resistance that had to be inserted in the circuit. Methods of calculating the number and arrangement of lamp to use as resistance for battery charging will be given later.

If a number of batteries be connected in series and all be charged at the same time, the loss in the series resistance will be greatly reduced and the cost of the energy for each battery will be less than in the case of a single battery being charged alone.

For example, suppose fifteen 6-volt batteries be connected in

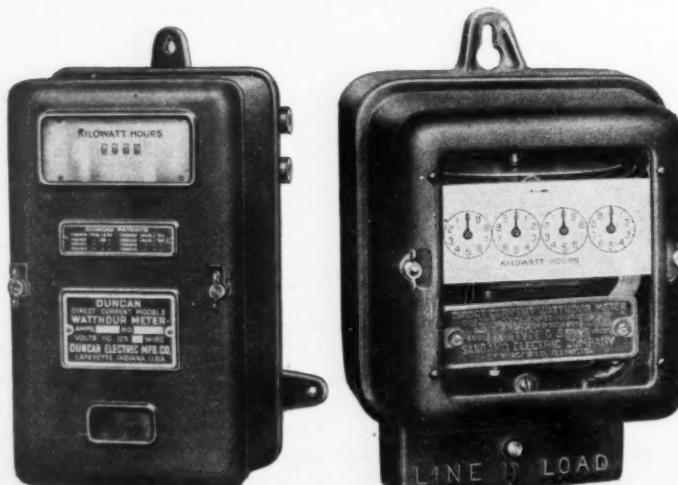


Fig. 41—Two typical forms of watt-hour meters

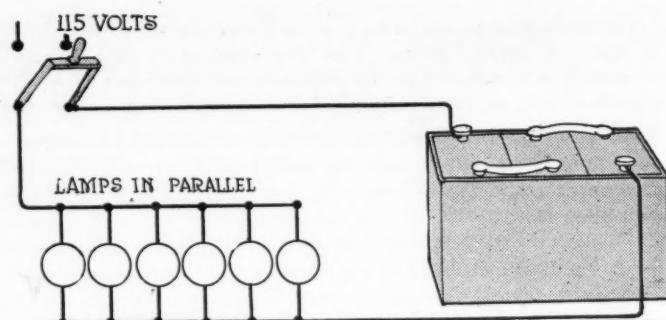


Fig. 42—Showing method of placing lamps in series when charging battery to regulate resistance

series and charged at a 5-ampere rate for 15 hours from a 115-volt circuit and that the average voltage of each battery during the charging operation is 7.0 volts. What will it cost per battery if you have to pay 10 cents per kilowatt-hour for energy?

The total voltage over the fifteen batteries in series will be equal to $15 \times 7 = 105$ volts,

and the pressure acting on the resistance placed in series with the battery will be equal to $115 - 105 = 10$ volts.

This pressure of 10 volts is to produce a current of 5 amperes, hence the value of the resistance of the series resistance will be equal to $10 \div 5 = 2$ ohms.

The loss in this 2-ohm resistance will be less than 1/10 of the loss in the 21.6-ohm resistance, assuming they both carry the same current.

The total energy drawn from the circuit will be the same in this case as it was in the previous case, since the value of the current, the pressure and the time are each the same. The cost of the energy in this case, however, is not charged up to a single battery but to fifteen, which greatly reduces the cost of charging a single battery as compared to the case when a single battery was charged at a time. In this case the cost per battery will be equal to .86 divided by 15, or .057 dollars, or 5.7 cents.

Torque

The torque of an engine, electric motor, etc., is the tendency for the shaft of the engine, electric motor, etc., to turn. For example, if a lever be clamped to the shaft of a motor and a spring balance attached to the outer end of the lever, as indicated in Fig. 43, the torque may be measured by noting the pull in pounds on the spring balance and then multiplying this reading by the distance from the center of the shaft of the motor to the point where the spring balance is attached.

Suppose the conditions are such that the net reading of the spring balance is 10 pounds and that the length L in Fig. 43 is $\frac{1}{2}$ foot. Then the torque is equal to $10 \times \frac{1}{2} = 5$ pound-feet. The unit in which torque is measured is called the pound-foot.

The torque of a revolving shaft may be measured by means of a device called the prony brake, Fig. 43 illustrating one of the simplest forms, though it usually is made to fit a pulley or fly-wheel instead of the shaft itself.

It is interesting to note that the torque is independent of the value of the length L for if this length be increased or decreased there will be a corresponding decrease or increase in the value of the net scale reading, all other conditions remaining constant. For example, if you were holding on to the end of the arm L you would have to exert a greater force with a short arm than with a long arm in order to prevent the arm turning around, but the product of the force and the length of the arm would remain constant so long as the turning effort of the shaft remained constant.

Suppose the prony brake is replaced by a rope as shown in Fig. 44 and that there is a spring balance attached to each end of the rope. The torque in this case is equal to the product of the radius of the pulley in feet and the difference in the readings of the two spring balances. The rope may be placed over the top of the pulley and weights W_1 and W_2 used instead of the spring balances as shown in Fig. 45, and the torque in this case is equal to the

product of the radius of the pulley in feet and the difference in the readings of the two spring balances.

In Figs. 44 and 45, there is a force acting at the surface of the pulley which is equal to the difference in the readings of the

wire around the flywheel with one end of the wire fastened to the wheel and the outer or free end attached to a spring balance and a pull then produced on the ring of the balance ample to turn the engine over at the desired speed, the torque required will be

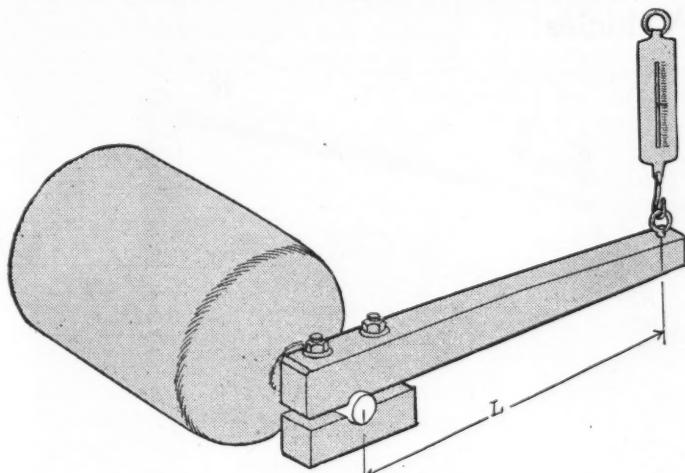


Fig. 43—One of the most simple methods of measuring the torque of a motor

spring balances or the difference in the two weights in pounds. This force acts through a distance in 1 minute equal to the distance a point on the surface of the pulley travels in 1 minute. If the radius of the pulley in feet be represented by R then a point on the surface of the pulley will travel around the circumference; that is, $2 \times 3.1416R$ or $6.2832 \times R$ feet in each revolution. Now if the number of revolutions per minute be represented by r.p.m., the distance the point on the surface of the pulley travels in 1 minute will be equal to $6.2832 \times R \times$ r.p.m.

The force, in this instance, is the difference between the readings of the two spring balances in Fig. 44 or between the weights W_1 and W_2 in Fig. 45. R corresponds to the distance L in Fig. 43 as it is the length of the arm through which the force acts.

This distance, multiplied by the force, which we will represent by W , will give the work done in one minute, or

$$\text{work per minute} = 6.2832 \times R \times \text{r.p.m.} \times W$$

The work done per minute divided by 33,000 will give the horsepower, or

$$\text{horsepower} = \frac{6.2832 \times R \times W \times \text{r.p.m.}}{33,000}$$

In the above expression $R \times W$ represents the value of the torque, hence the equation for horsepower may be written as follows:

$$\text{horsepower} = \frac{6.2832 \times T \times \text{r.p.m.}}{33,000}$$

in which T represents the torque in pound-feet and r.p.m. represents the revolutions per minute.

Determining Torque Starting Motor Must Develop

Since the value of the torque is independent of the lever arm, it makes no difference whether the torque be measured as indicated in Figs. 44 and 45 or by means of the prony brake.

The torque required to turn a gasoline engine over at a given speed may be determined in the following manner: If a wire be

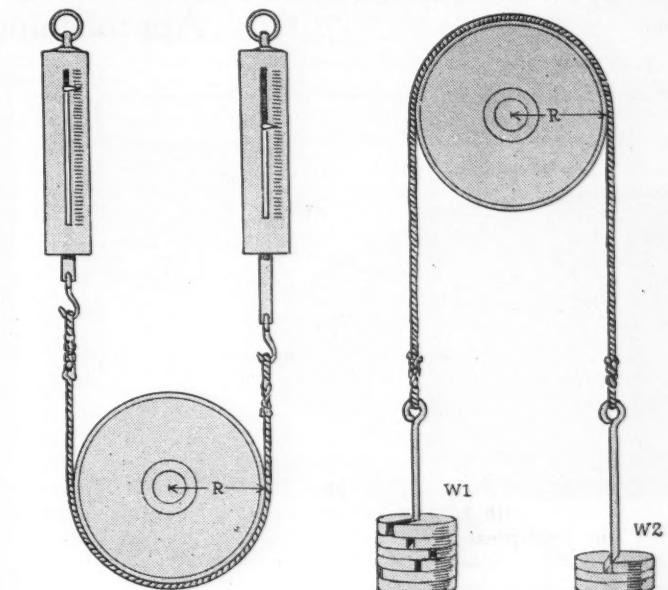


Fig. 44 and 45—Measuring torque by means of two spring balances and also by two sets of weights

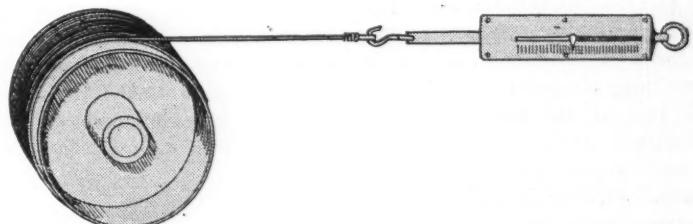


Fig. 46—Determining torque necessary to revolve engine at definite speed

equal to the pull in pounds on the wire multiplied by the radius of the pulley in feet. The arrangement of this test is shown in Fig. 46.

The starting motor must be capable of producing the same force at the surface of its pulley or gear when connected as shown in Fig. 46 as is required at the surface of the flywheel to turn the engine over. The torque of the motor, however, will be much less than the torque required to drive the engine, because the radius of the pulley or gear on the motor is much less than the radius of the flywheel. The speed of the motor will be as many times greater than the speed of the engine flywheel as the radius of the flywheel is times the radius of the pulley on the motor. Neglecting losses, the output of the motor in horsepower will be equal to the input to the engine in horsepower, because the product of the speed and the torque in the two cases will be the same.

Determinations of the torque required of an electric motor needed for cranking the engine of a car are necessary when cranking apparatus is to be selected or installed. Similar methods also are used in finding the size and type and gearing of electric motors for electric cars.

NEXT WEEK

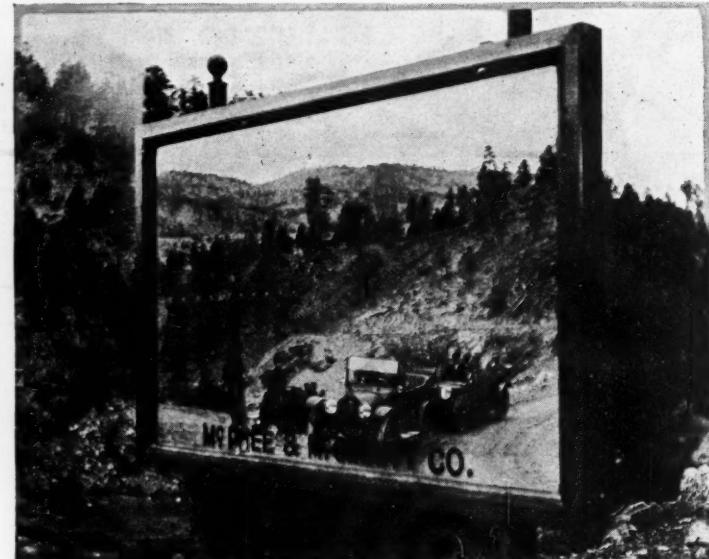
The simplest form of the different devices for obtaining electrical energy is the primary battery, of which the dry cell is the most common example. In Part VI of the series on the Electrical Equipment of the Motor Car, which will appear in the issue of Motor Age for August 3, the operating principles of primary batteries will be taken up. Special attention is devoted to the dry cell with instructions for selecting the proper type for a given service and the best ways to connect the dry cells for different classes of work.

Mirrors Increase Safety of Denver Parks Drive

Hairpin Turns Shorn of Their Danger—Tourist Can See Approaching Vehicles



Above is a view of one of the mirrors used on the Denver parks drive and shows how they are set. At the right, the reflection



MOTORING through Denver's municipal mountain park system is now the safer and more enjoyable on account of two large mirrors placed at the outer edge of two of the sharpest curves between Morrison and Evergreen, in the Bear Creek canyon link of this mountain boulevard. As the car approaches one of these hairpin turns the driver can see the road on the other side of the curve reflected in the mirror and so can guard all the better against danger of colliding with anyone coming from the opposite direction.

The mirrors are 3 feet wide by 5 feet long, with heavy frames covered by moisture-proof copper store fronting, and are mounted upon posts of iron pipe firmly set in solid rock and cemented in place. They were donated by the McPhee & McGinnity Lumber Co., and their installing was aided by the Mountain States Telephone Co.'s special equipment for drilling rock and setting posts of this kind.

Fine for Damaging

The mirrors are considered of such great value to motorists that a public appeal has been made for their care, and a reward offer of \$25 for the conviction of anyone maliciously damaging them will be posted on each mirror by the Denver Motor Club. The club has also started a campaign to enlist other large concerns to donate similar mirrors for use at a dozen or more other sharp curves along this foothills highway. It is urged that the usefulness of such a gift is far beyond the cost, and that every mirror would substantially increase the attractiveness of this lifelong-remembered trip through the glorious scenery of timbered canyons, rushing mountain streams and boulevard-wrapped mountainsides. The entire trip from Denver through the park

system and return covers only 65 miles, half of which is wholly in the mountains, and which takes the motorist to points more than half a mile higher than the mile-high metropolis of the Rocky Mountain region. The road is wide and safe,

the grades easy, and the drive offers such remarkable features of scenery, highway engineering, and historic and geological interest that it is fast becoming famous among world-travelers who are converted by the gospel of See America Now.

Answers to Inquiries for Road Information

Bristol, Va.-Hagerstown, Md.

GATE CITY, Va.—Editor Motor Age—Kindly give me the best routing from Bristol, Va., to Hagerstown, Md., the towns I should pass through and the distance.—A. Wallace.

In going from Bristol, Va., to Hagerstown, Md., advise going north to Abington, Marion, Wytheville, Newbern, Christiansburg, Roanoke, Buchanan, Natural Bridge, Lexington, Fairfield, Greenville, Staunton, Harrisonburg, Newmarket, Edenburg, Woodstock, Strasburg, Winchester, and Martinsburg to Hagerstown. Distance is 483 miles. Volume 6 of the Automobile Blue Book will give you complete routing for this trip. Price, \$2.50. Automobile Blue Book Publishing Co., Chicago.

Touring in Canada

Clinton—Editor Motor Age—Kindly advise the requirements for taking a car from Detroit into Canada for the purpose of touring the province of Ontario for some 30 days, and then returning to the United States via Detroit.—O. L. Langellier.

The Canadian department of customs has just issued an order to its collectors governing the passing in and out of cars. This is apropos of the reciprocal arrangements now existing between some Canadian provinces and certain of the American states regarding motor licenses.

The new regulations provide that when a non-resident owner of a car manufactured abroad desires to bring such a machine into Canada for a stay of not more than 1 month he shall report at the customs house at the frontier port in Canada and present a certificate.

The collector, if satisfied that the machine is imported in good faith, may admit it without formal entry, furnishing the owner with

a certificate, to be given up to the collector at the port of departure and returned by him to the issuer.

The certificate will contain a complete description of the machine, the owner in each case subscribing to the statement that "the machine is not to be used for any commercial or business pursuits whatever while in Canada and shall be exported from Canada within 1 month." If a report of exportation is not received within 40 days by the collector issuing the permit he is required to forward to the department at Ottawa a duplicate of the certificate.

Lafayette, Ind.-Jacksonville, Fla.

Lafayette, Ind.—Editor Motor Age—Kindly give me the best route from Lafayette, Ind., to Jacksonville, Fla.—C. C. Robinson.

In going from Lafayette, Ind., to Jacksonville, Fla., the best routing for you to follow would be to go to Frankfort, Indianapolis, Columbus, Seymour, Salem, Louisville, West Point, Elizabethtown, Mammoth Cave, Springfield, Nashville, Huntsville, Chattanooga, Calhoun, Cartersville, Atlanta, Macon, Perry, Hawkinsville, Waycross, Callahan, into Jacksonville.

Volumes 4 and 6 of the Automobile Blue Book will give you complete running directions for this trip.

Paducah, Ky.—Chicago

Paducah, Ky.—Editor Motor Age—Kindly give me the best route from Paducah, Ky., to Chicago. Is it practical to ferry at Metropolis, Ill., and go direct from there by way of Mt. Vernon, Effingham, Champaign, Kankakee, etc.? Is there any route better than this?—West Kentucky Automobile Co.

In going from Paducah, Ky., to Chicago, the best routing to follow is to go to Metropolis, Fairmont, New Burnside, Harrisburg,

El Dorado, New Haven, Mt. Vernon, Evansville, then north to Princeton, Hazelton, Vincennes, Oaktown, Carlisle, Sullivan, Terre Haute, Armiesburg, Stone Bluff, Attica, Fowler, Goodman, Brooks, Morocco, Thayer, Crown Point, Dyer, and Hammond to Chicago.

Volume 4 of the Automobile Blue Book will give you complete running directions for this trip.

Chicago-Ansonia, O.

Madison, Wis.—Editor Motor Age—Kindly give me the best route from Chicago to Ansonia, O., and the total distance.—W. G. Hostetter.

In going from Chicago to Ansonia, O., the best routing is to go south through Dyer, Crown Point, Thayer, Rensselaer, Remington and Wolcott to Lafayette; east through Frankfort, Tipton, Elwood, Alexandria, Munzie, and Winchester, to Greenville, then north a few miles to Ansonia. Distance, 268 miles.

Volume 4 of the Automobile Blue Book will give you complete running directions.

Battle Creek, Mich.-Rock Island, Ill.

Battle Creek, Mich.—Editor Motor Age—I intend motoring to Rock Island, Ill., about August 1, from Battle Creek, Mich. Kindly give me the best route and also the most

convenient way to pass through Chicago.—O. C. Osmond.

In going from Battle Creek to Rock Island, Ill., through Chicago, advise going through Kalamazoo, St. Joseph, Stevensville, Three Oaks, Michigan City, Porter, Gary, Hammond, then into Chicago, west through Geneva, DeKalb, Rochelle, Sterling, and Hillsdale to Rock Island.

Going through Chicago you come in over the boulevard system into Jackson park, through the Midway to Washington park, then we advise you to continue west on Garfield boulevard to Western avenue, then turning north and following the boulevard system north to Garfield park where you turn west onto Washington boulevard, leaving the city in this way.

Volume 4 of the Automobile Blue Book will give you complete running directions for your trip.

Fort Smith, Ark.-Denver, Colo.

Fort Smith, Ark.—Editor Motor Age—Kindly give me the best route from Fort Smith, Ark., to Denver, Colo.—R. W. Neisler.

In going from Fort Smith to Denver, Colo., the best route for you to follow is to go to Van Buren, Chester, Armada, Blackburn, Fayetteville, Springdale, Rogers, Bentonville, Sulphur Springs, Pineville, Goodman, Neosho,

Joplin, Galena, Columbus, Oswego, Cherryvale, Independence, Oaks Valley, Moline, Winfield, Wichita, Hutchinson, Lyons, Great Bend, Kinsley, Dodge City, Garden City, Deerfield, Syracuse, Midway, Coolidge, Lamar, Las Animas, La Junta, Fowler, Pueblo, Colorado Springs, Castle Rock and Sedalia into Denver.

Volume 5 of the Automobile Blue Book will give you the routing from Winfield to Denver.

Grant Park, Ill.-Muskegee, Okla.

Grant Park, Ill.—Editor Motor Age—Kindly publish the most direct route from Grant Park, Ill., to Muskogee, Okla.—C. J. Hayden.

We advise that you go through Momence, Kankakee, Dwight, Pontiac, Lexington, Bloomington, Lincoln, Springfield, Jacksonville, Valley City, New Salem, Hannibal, Center, New Mexico, Columbia, Bonville, Marshall, Grand Pass, Dover, Lexington, Leviasy, Kansas City, Harrisonville, Butler, Nevada, Lamar, Carthage, Joplin, Galena, Baxter Springs, Miami, Afton, Vinita, Pryor, Mazie, Wagoner into Muskogee.

Volume 4 of the Automobile Blue Book will give you the routing to the Mississippi river and Volume 5 from Fort Preston, Ill., as far as Kansas City.

Youngsters Make Cross-Country Tour

WITH the arrival of a frisky young Ford as a playmate, Jack and Albert Coon, South Bend, Ind., aged 14 and 17 respectively, began to get some expansive ideas. As soon as they were on thoroughly good terms with their new pet they sought an audience with their father, A. E. Coon, and they said, said they:

"Dad, we know that car from radiator cap to rear spring shackle; we are no fair weather sports, and we want to drive to New York, just the two of us."

Dad was somewhat skeptical at first, but being a strong advocate of the development of self-reliance in youngsters, he finally agreed to let them go. And so they did.

Starting from South Bend on June 19, they rolled into New York on the after-

noon of the fifth day, ruddy of countenance and somewhat achy in the joints, but nevertheless exuberant.

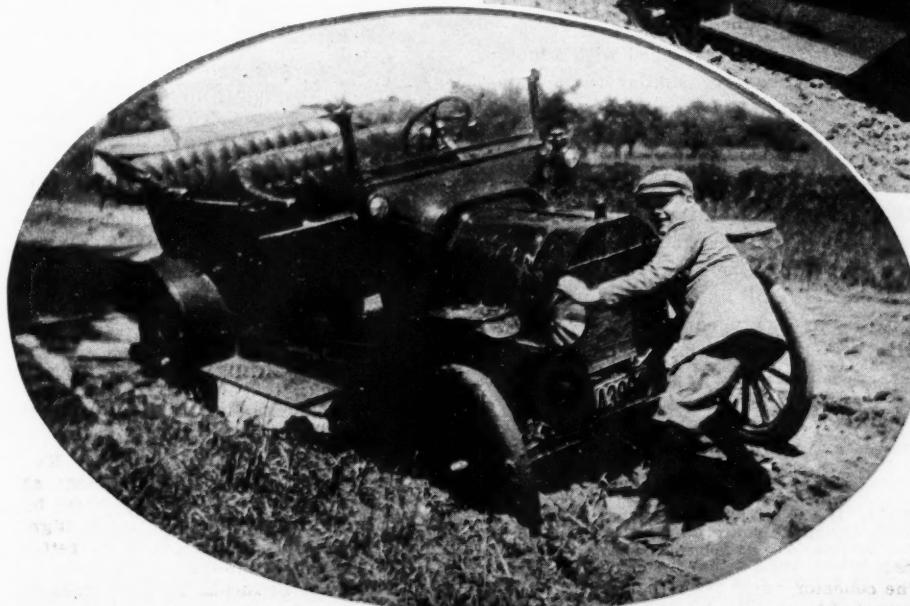
In their "Log of the Egg Beater" are some interesting entries, one of them being the brief but significant "tipped over

on Schedule Time

on high muddy road between Toledo and Erie; no damage done." The other days of travel developed no trouble beyond a single puncture and as evidence of their ability to take care of themselves and the car, daily telegrams arrived at home



Master Albert Coon, planning the best way out of the mud near Buffalo



Brother Jack cranks up after making minor adjustments

with monotonous regularity. "Arrived Toledo before 6" for the first day, followed by "Arrived Erie before 6" and so on, for the remaining days of the journey. The wire reports came with the regularity of the 6 o'clock whistle.

Following their arrival in New York the boys spent a week in Connecticut, after which their itinerary will be a month at Shelter Island on the extreme eastern end of Long Island, and they will return via Portland, Me., through Canada to Detroit and thence home.

The Readers' Clearing House

READER'S IDEAL SPORTING CAR

Low-Hung Racing Type with Four-Speeds,
Direct on High

TIFFIN, O.—Editor Motor Age—Some time ago I was much interested to note the designs of cars sent in by Mr. Ide, of New York, and Mr. Brason, of Chicago. The drawing accompanying this article represents an entirely different type of car, one made for the speedy and comfortable conveyance of two persons over almost any sort of roads.

The entire car is hung very low, this construction being obtained by use of a kick-up in the frame over both front and rear axles, thus doing away with the conventional drop in the frame between hood and body. In a car of this sort the lines must express speed. In order to obtain this result the eye must be drawn to the front end first. So the radiator is painted with the shell of German silver surmounted by a large filler cap with handles and motometer. From the radiator the lines are nearly horizontal until they taper off in the turtle-shell back. The hood is held down by a strap, this being the strongest construction. The ventilators are placed in the upper part of the hood and near the floor of the body are placed other ventilators, thus giving fresh air under the cowl dash where it is most needed.

Rakish Slant on Steering Column

The steering column is rakishly slanted. There is also a tilt to the cushions which are placed directly on the floor of the body and the backs are slanted to the most comfortable angle. All controls are within easy reach. The gearshift and emergency brake levers are placed on the left side in the most convenient position for operating with maximum comfort. Small lockers are placed in the filler board under the cowl for gloves, goggles, small tools, etc. The upholstering is deep and soft, as the car is designed not for racing but for fast cross-country work. The gasoline tank is placed back of the seat. The filler cap is large with handles for easy opening and feed is by the vacuum system. Behind the tank under the turtle shell back is quite large space for tools and accessories. Wire wheels are used with the tire 32 by 4½ front and rear. The front axle, placed front of the radiator is heavily dropped, thus providing quarter clearance between spring and frame.

The springs, front and rear, are semi-elliptic, this type giving the least possible side sway with the greatest ease of riding. The Hotchkiss system of final drive is used. Notice that the rear springs are shackled at the front end and that the driving strain is applied at the rear end

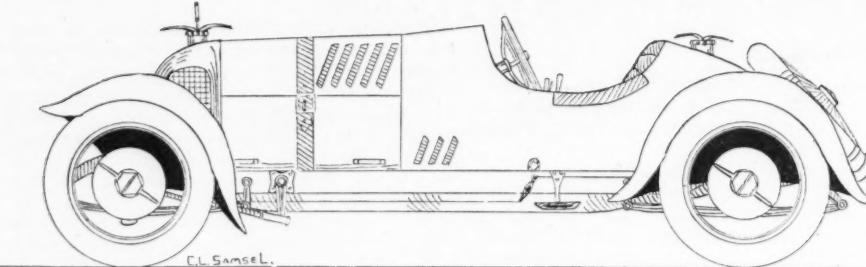


Fig. 1—Reader's idea of a touring speed car

of the frame horn. Thus the action of the wheels is to pull the car instead of pushing it, as it would if springs were shackled at rear instead of front, this pulling action tending to keep the rear end of the car on the ground. The fenders are of one piece pressed-steel construction and are fastened to the axle. Brakes on all four wheels are used, these being operated by the hand levers. The foot brake operates on a drum on the driving shaft. As the tendency is to lighten the unsprung weight on present-day cars as much as possible, the rear axle housing is of aluminum and the gearset is located amidships, and four forward speeds are provided.

One of the problems regarding high speed engines which has claimed the attention of motor car engineers is the engine speed to wheels ratio. Most of them solve it by providing a three-speed gearset with direct on third speed. I believe that the solution is in the four-speed transmission with direct speed on fourth. Thus on level country and good roads a high average speed car can be obtained with minimum fuel consumption and engine wear, while in bad going or crowded traffic one can drop into third speed and travel slowly with more reserve power in command.

A car of this type equipped with a motor of the Duesenberg or similar type, capable of 2,000 to 3,000 revolutions per minute with a gear ratio of 2½ to 1 on direct drive could easily maintain an unusually high average speed on good roads and with a third speed geared 4 to 1 could be slowed down to 5 miles per hour in traffic. It would get away like a rabbit and in bad going would pull like a locomotive. It would be as easily controlled as a baby carriage and as safe at speed as the 20th Century Limited.—Warren E. Oathwaite.

APPLYING BRAKES WITH CLUTCH IN Unnecessary Strain Placed on Working

Parts With Such Practice

Elgin, Ill.—Editor Motor Age—I recently had an argument concerning the braking of a car. My idea is that you should disengage the clutch before applying the service brake, but the other party's idea is to brake against compression, or in other words not to disengage clutch first. Who is right or wrong?—L. K. Schmidt.

You win the argument. Braking with the clutch engaged means that the brakes must not only impede the momentum of the car but of the engine and entire running gear as well. With the clutch disengaged the brakes have nothing to hold but the rear wheels, axles and drive as far as the gearset. Furthermore, braking with the clutch in exerts a strain in the bearings and driving members which, if continued, is bound to be the source of trouble.

ENGINE SPEED VS. HORSEPOWER

Buick Will Develop 45 Horsepower at 2,000 Revolutions Per Minute

Presque Isle, Me.—Editor Motor Age—How many revolutions per minute does the motor of the D-45 Buick turn over to develop 45 horsepower?

2—If a D-45 Buick, with a 4 to 1 gear and 34- by 4-inch tires, is running at 5 miles an hour on low gear, what will be the revolutions per minute of the engine?

3—What will be the horsepower under the above conditions?

4—What will be the number of revolutions per minute at 15 miles per hour on high gear, and how much horsepower will it develop with 4 to 1 gear ratio?

5—What would be the speed of a Chalmers 6-30 stock car on the road in high gear with the motor running at a speed of 3,400 r.p.m., on a 32 by 4 tire and with 4½ to 1 gear ratio, and what power would it develop with a 3½ by 4½ L-head motor?—L. S. Bean.

1—2,000 revolutions per minute.

2—628 revolutions per minute, approximately.

3—About 14 horsepower.

4—The revolutions per minute will be 593, and the horsepower in the neighborhood of 13.

5—About 71.6 miles an hour. We cannot give you the horsepower at this speed because the power curve furnished us by the Chalmers company does not run above 2,400 revolutions per minute, at which speed the horsepower is 44.5.

THE COMPRESSION OF MOTOR GASES

Trouble Would Be Encountered in Overcoming Vaporization

Blue Island, Ill.—Editor Motor Age—In the May 25 issue of Motor Age I noticed that the important point in racing motors was to get a large amount of gas into the cylinder, burn it and have it pass out again in a short time. Would it be to any advantage to have the gas charge compressed by a pump, that is, have the carburetor manifold lead to an air compressor which compresses a charge in a tank which leads to the intake valves?

2—Would there be any trouble with back-firing?

3—If it will not work on a poppet-valve motor will it work on a sleeve or rotary-valve motor?—H. Krueger.

If the gas could be compressed in a pump and still fed into the cylinders in vapor form such a system would undoubtedly increase the power of the motor. Short manifolds and carburetor heating jackets are applied to avoid condensation of the gases before entering the motor, and if these gases were obliged to pass through a compressing medium it is very probable that difficulties would be experienced in maintaining the charge in a gaseous state.

2—There is no reason why back-firing should result.

3—The two types do not differ as far as permitting a pressure feed of the gases.

NOVEL TUBE DEFLATING DEVICE

Suggested Equipment May Also Be Used for Vacuum Cleaning

Chicago—Editor Motor Age—Here is a suggestion along the line of a simple tube deflation device. Nearly every garage has a power tire pump of some kind. Why not make a connection between the pump intake and a vacuum tank as shown in the diagram? A by-pass valve would have to be inserted in this connection to supply the pump with the necessary air above what the vacuum system would afford. This could have a spring adjustment to maintain a constant vacuum. If such a valve is not readily obtainable, one can be made from an old carburetor auxiliary air intake soldered into an ordinary galvanized T.

I see no reason why the use of this apparatus could not be extended as a vacuum cleaning system for cleaning air cushions, etc. Of course, some kind of air cleaner or washer would have to be installed between the cleaning tool and the tank to keep dirt from injuring the pump.—Reader.

A copy of the diagram submitted is shown in Fig. 2.

CAR SPEEDS WITH FULL CAPACITY

Hudson Wiring Diagram Shown—Piston Displacement Figured

Tangent, Ore.—Editor Motor Age—Has the H. A. Lozier Co., of Cleveland, Ohio, any connection with the Lozier Motor Co., of Detroit?

2—What is the speed of the 1917 Hupmobile touring car with five passengers?

3—Can you give the reason for the high driving done by Rickenbacher in the last Chicago race?

4—What is the speed of the following cars with top and windshield down loaded with full passenger capacity? Packard twin-six, Hudson Super Six, Cadillac 8, Enger 12, Buick four-cylinder, H. A. L.?

5—Where can I procure a copy of the patent of the Hudson Super Six motor?

6—How can I tell how many cubic inches there are in a 3.4 by 5.5 motor, six-cylinder?

7—Please publish wiring diagram of Hudson super-six.

8—Kindly give me the address of the manufacturers of the following cars: Roamer, F. R. P., Rolls-Royce.

9—A certain manufacturing company makes an eight-cylinder Knight motor car selling at \$2,080. Would Motor Age consider this better than an eight-cylinder poppet valve motor selling for about the same price?—Delmer R. Luper.

1—No.

2—To the best of our knowledge the 1917 Hupmobile has not yet been announced. The factory lists the speed of the 1916 car at 55 miles per hour.

3—That is a thing which only Rickenbacher himself knows. Possibly he had in view gaining a more unobstructed track by getting away from the cars which held to the pole.

4—Packard, approximately 70 miles per hour; Hudson, approximately 70 miles per hour; Cadillac, approximately 70 miles per

hour; Enger, 60 miles per hour; Buick, 50; H. A. L., no information.

5—This can be obtained from the patent office at Washington for the sum of 5 cents. If you are able to obtain the patent number from the factory or elsewhere it will speed up getting the papers from Washington. If you will describe the patent, however—and in the case of the Hudson it covers the counterbalanced crank-shaft, not the motor, as you state—a copy will come forward to you from Washington.

6—A 3.4 by 5.5 six-cylinder motor has a displacement of 299.16 cubic inches. A formula for figuring displacement is $D^2.7854 SN = PD$, where D equals bore, S equals stroke, N equals the number of cylinders and PD equals displacement.

7—This is shown in Fig. 3.

8—The Roamer is made by Barley Mfg. Co., Streator, Ill. Finley R. Porter Co., Port Jefferson, L. I., makes the F. R. P. The Rolls-Royce is an English-made car and the American importer is R. W. Shutte, 236 W. 54th St., New York City.

9—There are a vast number of arguments for both forms of motors. Each has its advantages and each, when properly constructed, is thoroughly reliable. The matter of selection between the two is entirely up to the prospective purchaser.

IRA VAIL'S SUPER-SIX AT CHICAGO

Racing Car Had Reconstructed Stock Motor—Geared Higher

Indianola, Ill.—Editor Motor Age—Did Vail, driving a Hudson super-six in the Chicago 300-mile race, use a motor other than the super-six stock motor?

2—What kind and what grade of motor oil would Motor Age suggest using on a Hudson 6-40 model 1916?

3—Also what make of spark plugs would Motor Age recommend for the above named car?—O. E. Moreland.

1—Vail drove a reconstructed stock motor in the Chicago race. That is its reciprocating parts were considerably light-

ened for high speed work and timing adjustments were slightly altered. The gear ratio was higher than in stock cars.

2—No particular make is suggested inasmuch as one grade may work successfully in one locality and not in another. This has been the case in a number of instances brought to our attention. It is suggested that you purchase as high a grade of oil as is obtainable in your locality. Cheap oils are poor economy. If you have a high speed motor a lubricant of medium body is preferable to one of light body. See page 40 of the July 13 issue of Motor Age for methods of lubricant testing.

3—The kind the factory furnishes as regular equipment.

MEANING OF ROUGH STUFF PAINT

Quick-Drying Enamel Suitable for Patching Checks in Finish

Braintree, Mass.—Editor Motor Age—I understand the first few coats of paint on a car goes by the name of rough stuff. What is its composition?

2—Where can it be purchased?

3—When the finish is checked can it be used as a filler for the cracks, or must all paint be first removed?

4—Is lead and turpentine as good? If not, why not?—F. Herbert Gile.

1—Rough stuff or filler is a heavy grey paint, mostly lead.

2—From any reliable paint shop. Ask for a good grade of lead paint suitable for motor car body first coating.

3—When the finish is checked scrape off what paint there is around the check that is liable to chip or peel, then apply a quick-dry enamel of the proper color.

4—No. It is slow drying, difficult to color properly and will not spread evenly like quick-drying enamel.

Kerosene as a Fuel

Tampa, Fla.—Editor Motor Age—Kindly let me know through the Motor Age columns why kerosene is not used for motor cars instead of gasoline.—F. R. Struss.

Kerosene is a less volatile fluid than

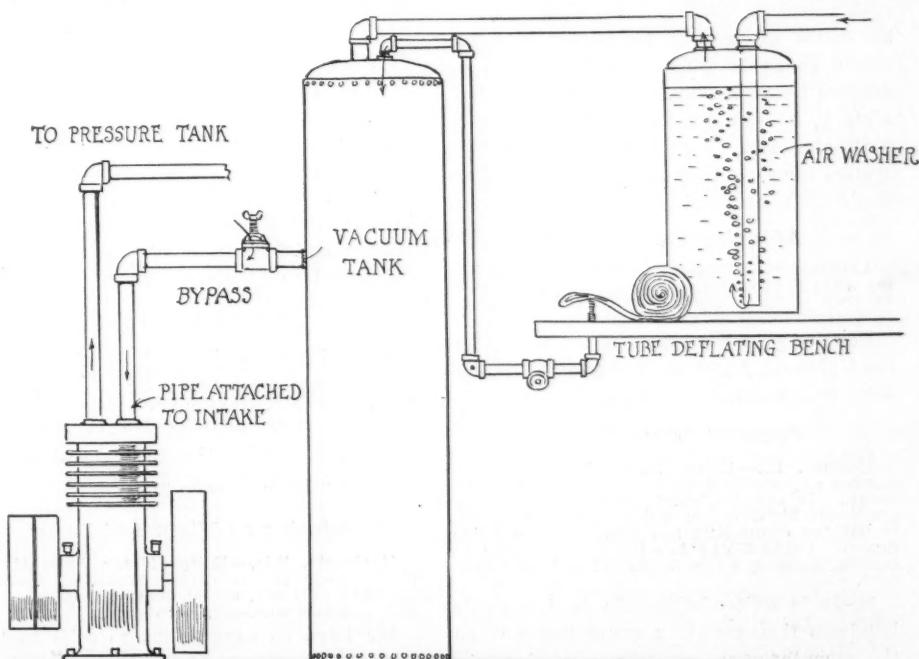


Fig. 2—Novel tube deflating device suggested by reader

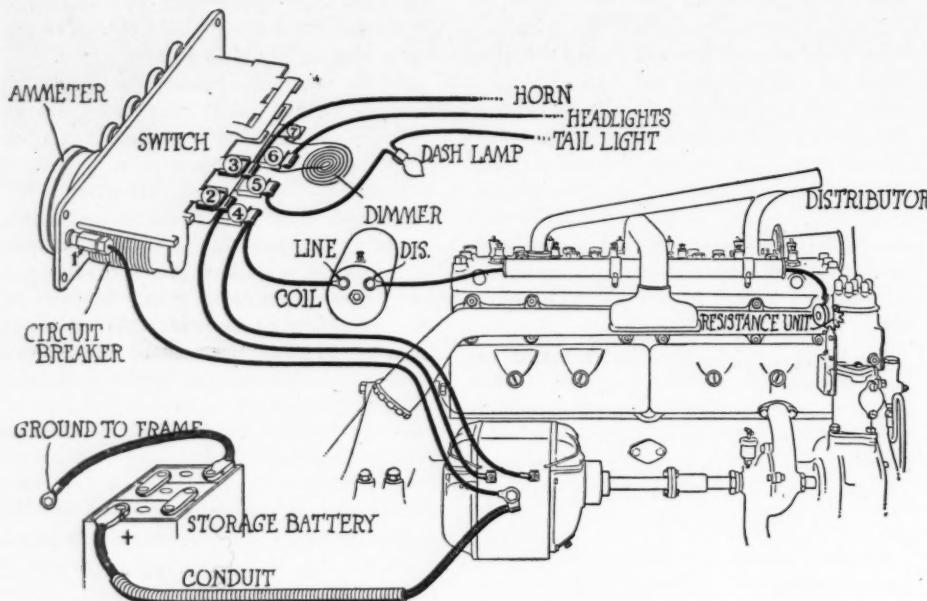


Fig. 3—Wiring diagram of Hudson super-six

gasoline, thus it will not burn as rapidly under the same conditions of temperature. The difficulty encountered in kerosene carburetion is in so heating the gases that they will not condense before entering the cylinders. You can readily see from this explanation that it would be necessary to provide some method of heating the kerosene for starting when the motor is cold and keeping it heated to afford efficient operation of the motor. As yet, to the best of our knowledge, designers have not perfected a system which completely overcomes this objection.

SIMPLE TIME-KEEPING SYSTEM

Garagemen Time Their Jobs With Use of Ordinary Watch

Fort Worth, Tex.—Editor Motor Age—We have a very neat system of time-keeping on repair work. We have provided each mechanic with a cheap watch. When he starts on a job, he simply sets his watch as at 12 o'clock, and if when he finishes he finds that the watch reads 2:15 o'clock, he has put in 2½ hours on that particular job. We have been using this system for some time and find it very practical.—Ray Automobile Co.

Adjusting Ford Clutches

Decorah, Ia.—Editor Motor Age—Kindly tell me what it is that causes the clutch on a Ford to grab when it is dropped back into high.—Nicholas Samuelson.

For the proper method of adjusting the Ford planetary gearset see page 22 in the June 8 issue of Motor Age.

Cause of Motor Knock

Macomb, Ill.—Editor Motor Age—I have a Jeffery Chesterfield six which has a peculiar knock. It can be heard on climbing a long grade on high, or on quick acceleration. It is not the connecting rod bearings or a valve tappet. Could Motor Age tell what makes this tapping noise and how to fix it?—Clyde Applegate.

1—It is quite impossible to lay one's hands on the cause of a motor knock when the symptoms are so meagerly given in correspondence. The possible causes are

Inquiries Received and Communications Answered

Warren E. Oathwaite.....Tiffin, O.
L. K. Schmidt.....Elgin, Ill.
Nicholas Samuelson.....Decorah, Ia.
L. S. Bean.....Presque Isle, Me.
H. Krueger.....Blue Isle, Ill.
Reader.....Chicago
O. E. Moreland.....Indianola, Ill.
F. Herbert Gile.....Braintree, Mass.
Delmer R. Luper.....Tangent, Ore.
F. R. Struss.....Tampa, Fla.
H. Friedstein.....Marinette, Wis.
Clyde Applegate.....Macomb, Ill.
S. H. Morris.....Goldfield, Nev.
W. W. Hall.....DeLamere, N. D.
Cohen Mercantile Co.....Woodville, Miss.
C. H. Walden.....Freeport, Ill.
W. Harden.....Chicago
Ray Automobile Co.....Ft. Worth, Tex.

No communication not signed by the inquirer's full name and address will be answered in this department.

too numerous. The first thing you might look for would be a spark knock. Possibly your motor is full of carbon and needs cleaning. Possibly you had it overhauled and upon reassembling the timing gears were not properly meshed and your motor is timed too early. A competent mechanic who will examine your motor is the only satisfactory way of determining the cause of the knock if you are unable to do so yourself. We would suggest that you get in touch with the nearest factory service station and have your car examined by a competent mechanic.

Motor Firing Order

Woodville, Miss.—Editor Motor Age—Kindly explain how the following cars fire: Chevrolet 490, Maxwell 1916, Buick 1916, Ford T, Dodge 1916.—Cohen Mercantile Co.

All of these engines fire in the order 1, 3, 4, 2, except the Buick, which is a six and fires 1, 4, 2, 6, 3, 5.

Running on Mixture of Fuels

Marinette, Wis.—Editor Motor Age—Kindly let me know in full details regarding running my 1915 Cole car, model 6-50, on half gasoline and half kerosene.—H. Friedstein.

We have no suggestions to offer in the line of adjusting your car to run on half gasoline and half kerosene. It is very

probable that you could not do so satisfactorily without the installation of a new carburetor. Kerosene is heavier and less volatile than gasoline and consequently will not vaporize without the application of heat. The use of kerosene in motor cars is still in such an indefinite and experimental stage that Motor Age is not in a position to give any information of universal value in this regard.

POWER VERSUS AIR RESISTANCE

Formula Given for Determining Amount of Horsepower Necessary

Chicago—Editor Motor Age—In designing a racing car, how can I tell the amount of horse power required to overcome air resistance? How can I obtain approximate figures on the air resistance?—W. Harden.

2—Is there such a thing as a formula by which the power can be determined to overcome a certain wind resistance?—W. Harden.

1—In the design of racing cars it is not necessary to consider speeds below 15 miles per hour in ascertaining the horsepower required to overcome air resistance. Above that figure, however, the speed of the car bears a close relation to the air resistance. An approximate formula for calculating the horsepower to overcome air resistance is as follows:

$$H.P. = \frac{V^3 \times A}{240,000}$$

H.P. is the required horsepower, V the velocity of the car in feet per second, and A the projecting area of the front of the car in square feet. The projecting area may be approximated by multiplying the width of the car body at the front seat at the frame line by the distance from the center of the wheels to the highest point, either the windshield, the seats or the top. This formula assumes still air.

2—A formula for use in approximating the power required to overcome wind resistance is as follows:

$$H.P. = \frac{PA(M 5,280 \div 60)}{33,000} \text{ or } .00267 P A M$$

H.P. is the horsepower required to overcome air resistance, P the pressure of the wind in pounds per square foot, A the front area of the body in square feet, and M the speed of the car in miles per hour. It is not believed that this formula will hold true for all ranges of speed.

Measuring Gasoline Level

Goldfield, Nev.—Editor Motor Age—As a reader of Motor Age, I would like very much to get some information relative to measurement of gasoline in Buick tanks. I am under the impression that Motor Age published this information some time ago, but I have either misplaced or lost my copy containing it. The information I want was, as I remember, given in such a manner that by measuring the height of liquid in tank one was able to tell at a glance just how many gallons were on hand.—S. H. Morris.

A table for laying out a measuring stick will be found on page 37 in the July 20 issue of Motor Age. An explanation of the table is included in the answer to the questions submitted by William Scott, which is given on the same page.



The Motor Car Repair Shop



Some Facts About Gasoline and Its Proper Storage

If the gasoline which is needlessly wasted each year were properly conserved by suitable methods of handling and storing, it is very possible that the law of supply and demand would be sufficiently varied from its present proportion to create a noticeable reduction in the price of this fluid of rapidly increasing value.

Factors which combine in gasoline waste are: Above-ground storage, permitting evaporation and reduction of the fuel strength; leaking faucets in above-ground sheet iron tanks, slopping over from careless handling and the over liberal use in cleaning greasy parts by the repairman.

Waste in Cleaning

Every large garage should institute a system whereby the repairmen should be given a fixed amount of gasoline for a repair job of a certain character, and these repairmen should be given to understand that gasoline waste is a costly item for the garage. Garages, large and small, should come to realize that an underground system which is, in first cost, more expensive than a galvanized tank, will soon pay for itself in the fuel it saves, and incidentally, in the reduction of insurance rates.

On account of gasoline being so volatile, it has been adopted for use in gasoline engines because it vaporizes easily and rapidly. The vapor, or volatility, is the point upon which the entire question of its use and care hinges. Before gasoline is of any use in the internal combustion engine, it must be vaporized and mixed with the proper proportion of air. The carburetor is the device in which this mixing is done. Then, why allow the gasoline to mix with air before it reaches the carburetor? It should be stored so that it may be taken from the place in which it is kept to the place wanted without chance of appreciable contact with air.

To get the best results from an engine, the same grade of gasoline should be used at all times. The carburetor is adjusted for a certain grade or test of gasoline. When this grade is used it makes the mixture the way it should be and you should give your repeating customers the same grade of fuel at all times to save them the trouble of making carburetor adjustments. Gasoline should be maintained at a constant temperature so that vaporization will not change its test.

To get an idea of the ease with which gasoline vaporizes, let it be compared with water. Water will boil or vaporize at 212 degrees fahrenheit, while the average grade of gasoline will vaporize at 113 degrees. Where gasoline is stored above ground in ordinary galvanized faucet tanks, in many sections of the country the sun

is hot enough in summer to vaporize the gasoline at the rate of nearly a gallon a day.

Of course there is no question that the danger of handling gasoline is greater than handling other commonly used oils. This danger is so well known that in a great number of instances it seems to have bred contempt, which in many cases has induced carelessness and indifference. The treacherous nature of this product should be seriously considered in any garage. Gasoline, unlike the heavier petroleum products, constantly throws off an explosive vapor even at very low temperature. Five gallons of gasoline will generate 8,000 cubic feet of gas which, when ignited, expands to 4,000 times this capacity. Gasoline vapor is, in fact, more dangerous than dynamite as there is more liability of an explosion. Dynamite will only explode from two or three causes which may be easily guarded against, but an electric spark or any kind of any open flame will explode gasoline vapor.

Tremendous Power in Liquid

As an illustration of the tremendous power contained in this liquid, note what a small quantity it takes to drive a two or three-ton motor car mile after mile at any desired speed. Gasoline vapor is heavier than air consequently it settles to the floor and runs along the floor much as a stream of water would except that it is an invisible stream. This vapor will settle and remain in a depression in the floor, or under the floor, for days and even weeks, unless disturbed by a circulation of air. A spark will cause the accumulated vapor to explode and this has been the medium from which many a disastrous fire has originated. This spark does not necessarily have to come from a lighted fire but may occur through a person striking a nail in his shoe on the concrete floor, causing the spark, or from other similarly unavoidable causes. Tests also have shown that under certain atmospheric conditions, spontaneous combustion will occur in this accumulated vapor. A case is on record in which the gasoline fumes were carried outside of the building to a lighted lamp 30 feet away from the building, where it took fire and flashed back through the building, which was entirely consumed.

Another striking proof of the dangerous character of this fuel is brought out in several recent occurrences where a spark has been granted from frictional or static electricity caused by pouring gasoline through a funnel into the tank, the spark jumping between the funnel and the rim of the filling hole. Gasoline ignited in this manner has caused several bad fires.

The faucet tank so commonly used is dangerous, inconvenient and uneconomical. Examine any faucet tank and see if you will not be able to detect escaping gasoline vapor around the filling cap on the top no matter how tight it may be clamped down. Gasoline stored above ground is subjected to constant fluctuating changes in temperature with the result that evaporation is always taking place. If the liquid is stored underground, it is kept at practically uniform temperature throughout the year. Also when an underground tank is used in connection with a pump which feeds the gasoline directly from the tank into the motor car, loss of fuel evaporation is greatly reduced.

Referring to the use of gasoline in the car itself, economy can be practiced here as well. An improperly adjusted carburetor is a prize gas consumer. Valves with too much play, carbonized cylinders, and cheap lubricating oils all tend to swell the gasoline bills.

In most every gas line there is a strainer or trap, either in the line itself, or at the base of the carburetor. Few persons think to clean this occasionally before trouble is encountered. The present day fuel contains more or less waste matter, and trouble in the carburetor can be eliminated by cleaning this trap or strainer every month or two.

A relief cock with a handle that is horizontal when the valve is closed is liable to work open if the plug is loosened. More gasoline can be wasted through this medium. The best way to remedy such a trouble is to throw out the offending cock and buy a new one with a spring to keep the plug tight as it wears. Another method is to fill the hole in the plug with a piece of brass wire, carefully shaped to the contour of the plug, and drill a new hole in such a position that the handle will be pointed downward.

Troubles With Old Carburetors

Motor Age has received a great number of letters recently from owners of old cars, in which the statement is made that there appears to be no possible carburetor adjustment under which the motor will run satisfactorily.

The reason in practically every case can be attributed to the fact that the old carburetor on the car is not of suitable construction to take care of the present low grade of fuel. The only remedy is to install a new and modern carburetor especially designed to meet present-day needs. Continued use of the old device will not only lower the efficiency of the car but will swell the gasoline bill. Submit your troubles to a good company for specifications.

Buick Returns to the Construction of a Four-Cylinder Car

New Light-Weight Model
to Sell for \$665—Little
Six Continued With-
out Change

After giving up entirely for a time the manufacture of four-cylinder cars, the Buick Motor Co. is again to put them out, in addition to continuing without change the production of the little six-cylinder model that made such a hit during the last season. Reversion to fours by so large a manufacturer might be taken as a significant move, and indicates that there is a big demand for a moderate-priced vehicle of this type.

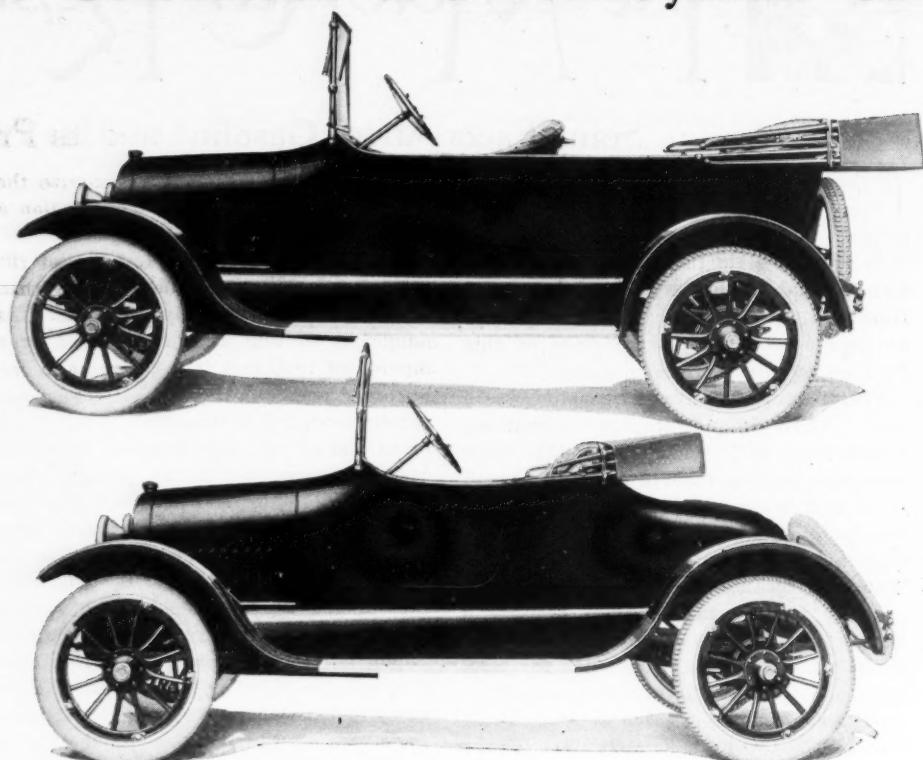
The new Buick four, which, needless to say, is to be made in large numbers, follows characteristic Buick design throughout, with perhaps more alteration in the motor than elsewhere, although that unit is a valve-in-head type as are other power-plants of this make. It will sell at \$665 as a touring car under the model designation of D-35, and as a roadster it will be priced at \$650 and known as model D-34. In its general lines, especially the radiator, the new car is typically Buick. It has a wheelbase of 106 inches, and there is plenty of room for five passengers.

35 Brake Horsepower Claimed

Thirty-five brake horsepower is claimed for the motor, which has a bore of 3½ inches and a stroke of 4½ inches, giving a displacement of 170 cubic inches and a N. A. C. C. rating of 18.2 horsepower. These cylinder dimensions are not a great deal different from those of the little six, which has a bore of 3¼ inches and stroke of 4½ inches.

Other specifications of interest are the pump cooling, Marvel carburetor in conjunction with rear tank and Stewart vacuum feed, Delco combination starting, lighting and ignition, cone clutch, three-speed gearset in unit with the engine, drive shaft enclosed within a torsion tube, three-quarter floating rear axle, semi-elliptic springs both front and rear, and 31 by 4 non-skid tires all around.

Although the engine is an overhead valve design, it is probably the one part that is most at variance with previous construction, in that the cylinder head is detachable as a unit with the valves. It will be remembered that previous Buick construction has been to have the heads integral with the body of the cylinders, and to use valve cages, which, when removed, brought out each valve individually. The new design makes it possible to get at the valves when the head is taken off, and at the same time gives a free opening into the cylinders and pistons. The valve springs and rockers are not inclosed, but are noiseless due to the



Characteristic Buick body lines on new four touring car and roadster

lubrication provisions and the interposing of a felt pad at the ball end of the push rod, as in previous design. The rocker shaft supports are bolted to the head casting, and this also carries the water outlet connection.

In the design of the head special provision was made for the proper cooling of the valves, the water passages surrounding the pockets being of good size. On the whole there is nothing radically different in the design of the motor as compared with the conventional overhead-valve, removable-head job, yet the details have been worked out to give a surprisingly compact whole.

In its general arrangement the motor has its push rods on the right, and both intake and exhaust manifolds occupy the left side. On the push-rod side is mounted the Delco single-unit starting and lighting unit, with ignition distributor an integral part of it. This motor-generator is driven off the pump shaft, which in turn is operated by a spiral gear, meshing with the camshaft gear. Mounted directly on the motor on the manifold side is the vacuum tank, and below it the carburetor, giving a very short feed pipe between tank and carburetor, with obvious advantage. The upper half of the flywheel is housed over by an extension of the upper portion of the crankcase, which is integral with the cylinder block. This extension meets an extension of the gearbox, and the two belt together by means of a flange, giving a substantial support to the gearset and kindred parts without excessive weight.

There are three main crankshaft bearings and an equal number carrying the crankshaft, both of which parts are of sturdy section so as to reduce the vibration and make a smooth-running engine. Valves are quite large—1½ inches diameter—and the gas passages are as direct as possible, both features being power-giving factors. Conventional connecting-rods of I-beam section, and pistons carrying three rings each are fitted, the wrist-pins being pinned to the pistons so that the upper rod end has a bearing on the wrist-pin.

Ample Water Spaces

Much attention seems to have been given to working out the cooling system, as evidenced by the wide water spaces, and the carrying of the cylinder jackets well down to within about 1 inch of the bottom of the piston stroke. The water spaces in the head are extra large, and it would seem that warped valves due to the heat are an impossibility. There is a three-blade pressed steel fan, belt-driven from the pulley on the end of the cam-shaft, with provision for adjustment of the belt tension through the rocking fan bracket that attaches to the front of the cylinder casting proper. The centrifugal pump delivers the water to the center of the passages insure even distribution all around. The cellular-type radiator is of generous proportions for this engine, and should have no trouble in caring for its needs.

Likewise, care has been expended on the design of the lubrication arrangements. Oil is drawn from the pressed-steel under part of the motor by a cam-operated

plunger pump, delivered through a supply pipe to each of the troughs under the connecting rods and also through a special lead to the timing gears at the front. It is then splashed in the usual way to the various bearing surfaces by the dipper on the end of the rod. The troughs are curved so as to follow the rod end for a considerable distance beyond its dead-center position on either side, taking care of any difference in level between one side of the car and the other. On top of each connecting rod's upper end there is a hole drilled to catch some of the splashed lubricant and lead it to the bearing, and the tappets are spirally grooved so that they carry oil on to the entire surface of the chambers in which they work, making for quiet operation.

On the left of the crankcase there is a breather, which is internally baffled so that any spray from the crankcase will not get out to collect on the outside of the engine, and there is also a float gauge connecting with an indicator hand that plays over a dial mounted on the left side of the crankcase to inform the driver how much oil he has.

Starting Motor Attachment

In common with practically all installations now, the starting motor meshes with teeth in the flywheel rim, pressing of the pedal meshing the armature shaft gears with these teeth. The ignition distributor sets vertically on the front of the electrical unit, and is driven by spiral gear connection with the motor-generator shaft. Mounted on top of the motor-generator case is the ignition coil, and as the spark plugs enter the cylinders on the same side of the engine, there is a minimum of wiring from distributor to plugs, etc. These and other wires are inclosed within metal flexible conduit, a precaution against trouble that cannot be too highly recommended.

Buick fits a leather-faced cone clutch to this car which is similar in design to that employed in other models. The cone itself is a pressing, and there are three springs placed at equal distances apart to hold the unit in engagement. There are also small springs inserted at intervals under the leather to force it out and

produce a soft action. The clutch assembly includes two ball-thrust bearings, the forward one taking the thrust from the engagement springs and the rear providing for the thrust occasioned by disengagement of the cone. The shaft on which the cone slides has six splines, and each of the engagement springs is provided with an adjusting nut which makes it a simple matter to give the proper tension, especially since the clutch can be reached below the bell housing without the removal of any parts.

Chrome-nickel steel gears are used in the gearset, these having teeth of stubby form so as to resist any suddenly imposed shocks. The bearing equipment for this assembly consists of a roller bearing for the clutch gear, double-row ball bearing for the square shaft, and plain bearings with bronze bushings for the countershaft.

The drive is taken through a single universal just back of the gearset, this being of large proportions and fully inclosed. The propeller shaft is also completely housed within a torsion tube that attaches to a large ball-and-socket joint on the rear of the gearcase, and terminates at its rear end in a flanged member that bolts to the front of the differential housing. Thus the torque is taken through the shaft housing and the ball joint at the front end, while the drive is through the rear springs.

Of three-quarter floating type, the axle is a compact unit designed so that all the car weight is carried on the axle tubes, with no supporting strain on the drive shafts. These are mounted on spiral roller bearings at both wheel and differential ends, with a ball thrust bearing also fitted at either side of the differential. The gears are of the bevel type, and the ring gear has fifty-three teeth to thirteen on the pinion, giving a ratio slightly over 4 to 1, thus allowing the motor plenty of chance to drive the vehicle with all the flexibility that should be desired.

In the rear spring arrangement Buick deviates from that of the little six, which has cantilever rear suspension. On the new four they are semi-elliptic, long and flat. The dimensions are 48 inches long by 2 inches wide and the mounting is

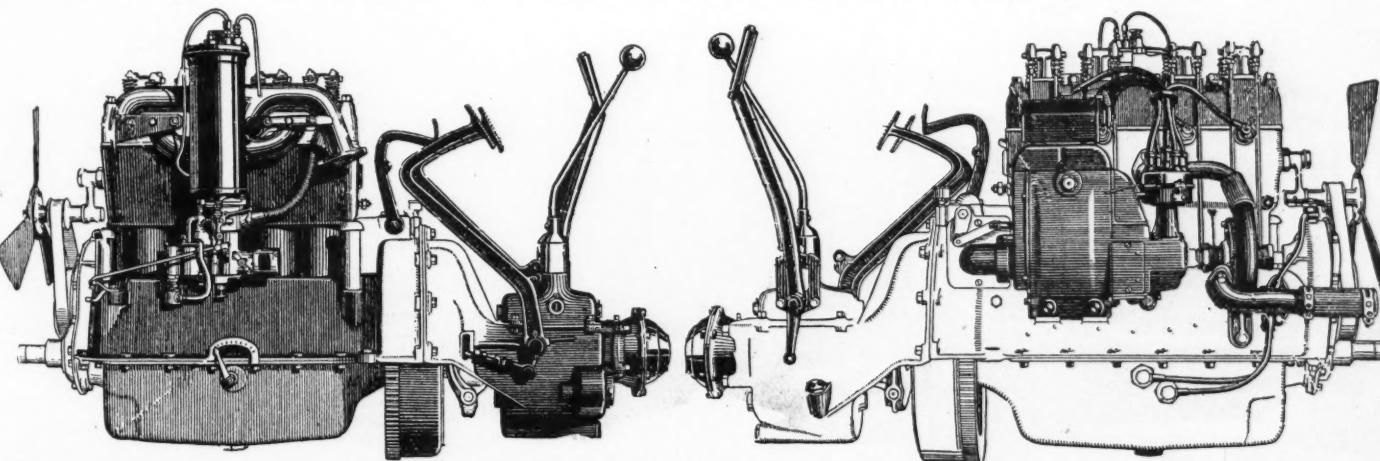
somewhat unusual in that they are not directly below the frame rails, but bracketed so that they run outside of the frame. This was done principally because the frame tapers straight from the back to the front, and if the springs were placed under the rails they would also be at an angle, and this would have introduced an undesirable bending moment. As the frame is narrower at the front mounting than at the rear, the brackets at the front are simply brought out farther to allow the springs to parallel the wheels. At the rear the frame members bend down sufficiently so that the springs are mounted almost flat, and this in connection with their length makes for easy riding, since the spring action tends to both sides of the horizontal, with dampening effect upon shocks.

Tapering the frame from back to front is also new to Buick design, but is becoming very popular with modern car designs. It allows a short turning radius, and at the same time gives excellent support for the tapering body along its entire length. To assist the side members there are four strong cross pieces, each anchored with the aid of gusset plates.

Hood Blends in Cowl

The popular sloping lines and smooth exterior, with hood blending into the cowl, are given the car, with sufficient rake to the steering wheel to give a good appearance. Attention has also been paid to the matter of leg room in the driver's seat, and almost any type of person ought to find comfort in driving the car.

Brought out over a year ago, the little six that is to be the new four's running mate for the coming year really requires no lengthy description here. It is known as model D-44 as a roadster, and with that body sells for \$985. The touring car on the same chassis is called model D-45, and the price is \$1,020. Briefly, the specifications, which are practically the same as they have been since the car was introduced, are $3\frac{1}{4}$ by $4\frac{1}{2}$ -inch motor, developing 45 horsepower; Delco ignition; starting and lighting; circulating splash lubrication; pump cooling; cone clutch and three-speed gearset; 34 by 4 tires and wheelbase of 115 inches.



Intake and generator sides of new Buick four-cylinder motor. All parts are high on the motor, making them readily accessible

Greatly Improved Monroe Roadster Increased in Price

Entirely New Motor, Designed by Brush Engineering Assn.,
Has Overhead Valves

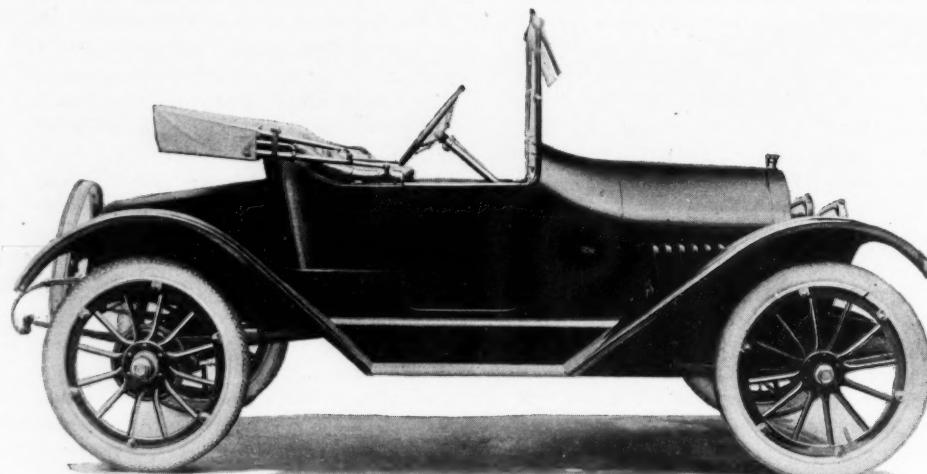
THE MONROE MOTOR CO., formerly located at Flint, Mich., but now at Pontiac, Mich., is now ready with its 1917 roadster, the only type of machine which it is making at present. Looking somewhat the same as the previous model, the new car, which is designated as model M-3, has a number of improvements over the model it replaces, all of which tend to make it a much better car. The price has been raised from \$495 to \$565, this partly due to the added cost of materials, and partly to the considerable added equipment and improvements in design and construction.

Chief among the changes over the preceding Monroe is the adoption of an entirely new motor to replace the $3\frac{1}{2}$ by $3\frac{3}{4}$ -inch engine that was used last year. The new powerplant is designed by the Brush Engineering Assn., Detroit, and has the same overhead-valve construction with outside adjustments that characterizes most of the engines Brush now lays out. This new engine has a bore of 3 inches by a stroke of $4\frac{1}{4}$ inches and is of the block type with gearset in unit.

Multiple-Disk Clutch Used

Along with the motor change a multiple-disk clutch takes the place of the previously-used cone type, and in the chassis several other modifications do their part in making the 1917 Monroe a better machine. The frame has been lengthened 3 inches at the rear to accommodate the longer rear deck now fitted, and the ratchet foot pedal that controlled the emergency brake heretofore has given way to the standard method of emergency control by hand lever. In front of the radiator a sheet metal piece has been fitted between the frame rails. This helps to send the air to the radiator, and also acts as a mud guard for the radiator.

Crowned fenders have replaced the flat variety of last year, and they do much



Body lines in the new Monroe roadster are very similar to those of the previous model

to enhance the outward appearance. This, together with the lengthening of the body back of the seat, suggest a larger vehicle even though the wheelbase remains unchanged at 96 inches.

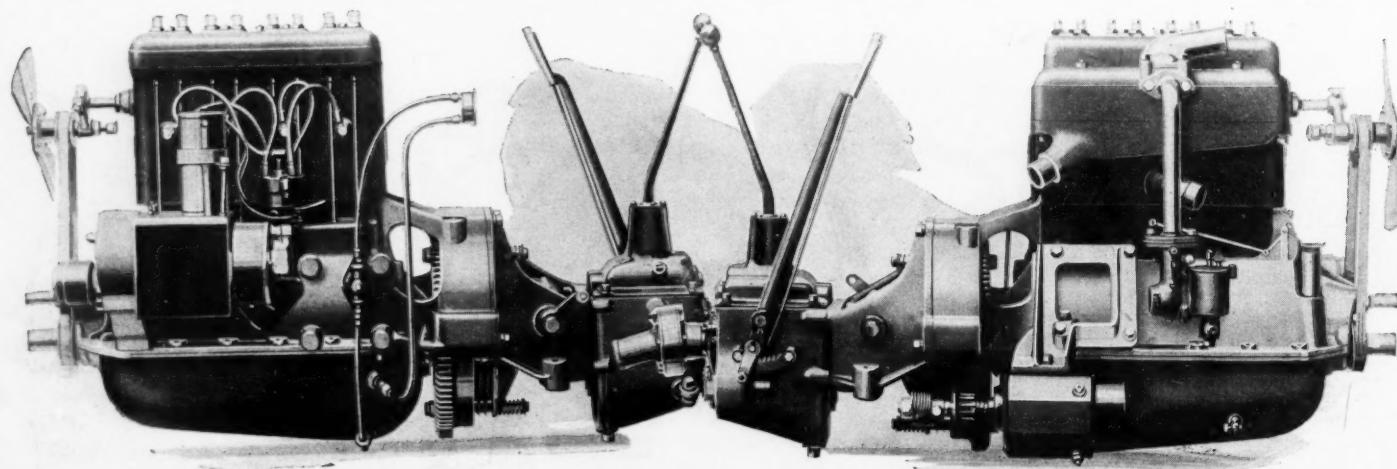
Considerable has been added to the equipment. Demountable rims have replaced the clincher type, and in the rear the tires are non-skid treads instead of smooth. A muffler cut-out has been put on, a feature which a great many drivers will appreciate. Then, a sight oil feed has been put on the dash; a lock switch for protection against theft of the car has been added, and there is also a Stewart-Warner speedometer.

Looking more closely at the details of the motor, it will be noted that the cylinders and upper half of the crankcase are cast in one piece, a construction very often employed where the cylinder-head is made removable, as it is in this case. The rocker arms and valves are carried in the head unit, being entirely inclosed within a single cover plate that bolts to the top of the cylinder head. Protruding through

the top of this cover plate are adjusting nuts which, after the lock nut has been loosened, can be turned by hand until the proper clearance between the end of the valve stem and the rocker is obtained. Thus, it is possible to secure an adjustment of the valves simply and accurately. The valve push rods run up to the rockers on the left side of the motor and the spark plugs enter the cylinders between the two rods of each cylinder.

Auto-Lite Electric System

Manifolds are on the right side, the intakes having but a single connection to the carburetor pipe at the center of the head casting. Hung from a bracket, attached to the right rear side of the upper crankcase, is the Auto-Lite starting motor, which is geared to the flywheel by means of the Bendix automatic starter drive. On the left and driven through gear connection with the camshaft is the generator, also an Auto-Lite unit. This generator has mounted on its top the ignition coil, and its rear end carries the vertical Connecticut ignition distributor which connects



Views of both sides of new overhead-valve motor of Brush design with 3-inch bore and $4\frac{1}{2}$ -inch stroke

to the armature of the generator by helical gears. The flywheel is only semi-inclosed, due to the use of a form of bell housing which extends back from the crankcase and integral with it, until it meets the forward extension at the gearbox. Thus the lower half of the flywheel is exposed, as well as a portion of the upper part where the crankcase extension is cut out to reduce the weight without affecting the strength.

Rocker Arms on Pivots

Peculiar to the Brush type of overhead-valve motor, the rocker arms which transmit the upward motion of the push rods into a downward motion on the valves are not carried on rocker shafts as is usually the case. Instead the rockers, which are steel pressings, have formed at their centers a socket which rests on a pivot and allows the same rocker motion that would be possible if the conventional form of shaft were used. The pivot is simply a threaded pin which seats in the body of the head, and its end protrudes through the top of the cover plate as already mentioned. Thus adjustment of the rocker is obtained by screwing this pivot in or backing it out as the case may require. The valves are quite large for a motor of this size, having a diameter of $1\frac{1}{4}$ inches and being operated by a two-bearing cam-shaft of generous proportions, the bearings of which measure $\frac{7}{8}$ inch in diameter by $2\frac{7}{8}$ inches long. It is driven from the crankshaft by helical timing gears which are completely inclosed in a compact manner.

Realization of the fact that a great deal of the smooth running of any motor depends upon the sturdiness of the crank-shaft and its support, the motor has been fitted with a main shaft that is also of good size, having two main bearings, the front measuring $1\frac{1}{8}$ by $2\frac{1}{8}$ inches diameter and length respectively, and the rear of the same diameter but $3\frac{3}{8}$ inches long. Although a moderately high-speed engine, it is fitted with a comparatively heavy flywheel, the diameter of which is 12 inches. It should be evident that the aim has been to produce a four-cylinder motor possessed of as many smooth-running qualities as possible.

Lubrication of the motor is accomplished by the use of a conventional splash system, with the troughs supplied by a plunger pump drawing its oil from the reservoir in the motor base. Each rod end dips into its trough and splashes the oil on to the several bearing surfaces in the customary manner. Simplicity is also obtained by the use of thermo-syphon cooling, which is very advantageous to a motor of this size. The head casting carries the water outlet to the honeycomb radiator, and water enters the cylinder blocks at the center of the right side. A fan driven by belt from a pulley on the crank-shaft is used, this having provision for adjustment of the belt tension by means of an arm attached to the forward end of the cylinder head.

From the motor the power passes through a simple, dry-plate clutch, having six disks alternately—Raybestos and steel. Three selective speeds are afforded by the compactly-designed gearbox, which is mounted in unit with the motor, in the manner already described. The gears are of double-heat-treated nickel steel, with the teeth of the stubby variety to resist driving strains and sudden shocks. The gear shafts are carried on ball bearings. A ball and socket control lever is positioned

on top of the gearbox proper, and the emergency brake lever attaches to the right side so as to play over a ratchet sector, also carried on this side.

Back of the gearbox there is a well-inclosed universal after which the drive-shaft enters a torsion tube which indorses it the rest of the way back to the rear axle. Thus the drive is taken through the rear springs while the torque is provided for by the propellor shaft housing. The rear axle is a three-quarter-floating type that affords a ratio of $4\frac{1}{4}$ to 1. Axles and pinion shafts are mounted on Hyatt roller bearings in conjunction with ball thrust bearings that take care of any end thrust. The axle tubes, which carry the car weight, are riveted into the two halves of the differential housing, and as a strengthening factor a truss rod passes below the housing from one brake drum to the other.

Springs 46 inches long and of three-quarter elliptic form are fitted at the rear, being mounted outside of the side members of the frame.

The new Monroe is painted a Royal blue as a standard color and is said to be capable of speeds ranging from 3 to 50 miles per hour on high gear. Tires are 30 by 3 inches.

Thomas Trucks Made in Four Sizes

THE Thomas 2-ton truck, manufactured by the Thomas Auto Truck Co., Inc., New York, is now ready for the market. The company was organized in the early part of this year for the purpose of building commercial trucks in four sizes— $\frac{3}{4}$ -ton, 1-ton, $1\frac{1}{2}$ -ton and 2-ton—the latter being the first model ready for marketing.

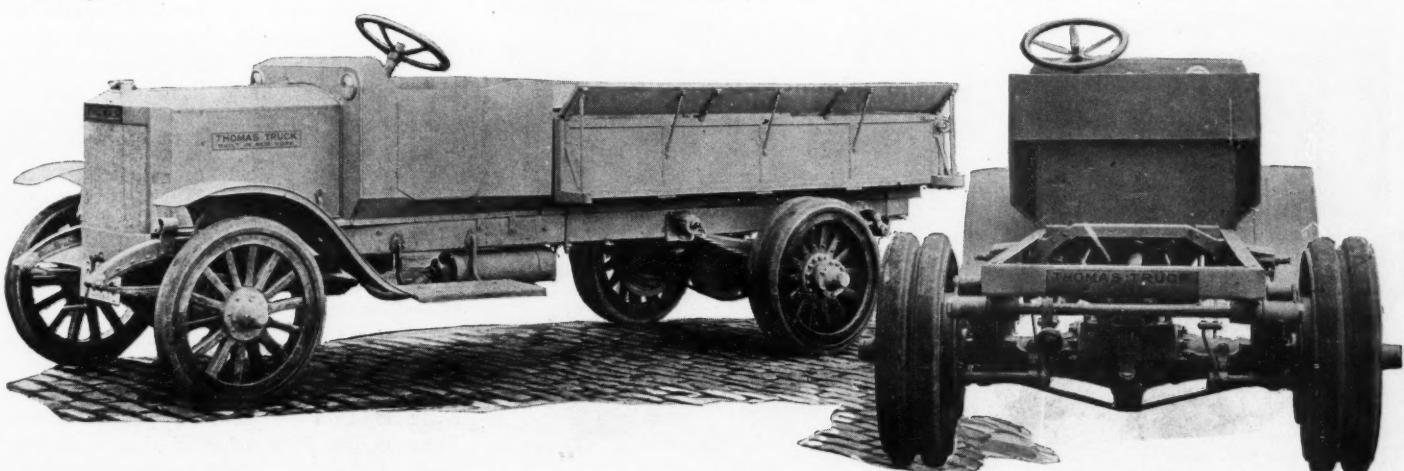
The motor is a Buda, $4\frac{1}{2}$ by $5\frac{1}{2}$, 4 cylinders. The oiling system is pressure feed by plunger pump to the main bearings and to the pockets in which the connecting rods dip, and this oil pump can be removed from the outside of the motor by loosening four bolts. Ignition is by a fixed-spark waterproof Bosch magneto. The cam shaft is integral and the cam bearings are case hardened and accurately ground. The tim-

ing gears are lubricated by a constant stream of oil from the pumping system.

Drive is worm, Timken, David-Brown axle, with driving stress and torque taken through the springs. Timken front axles are included with Timken bearing throughout. The truck is left-hand drive with the brake and gear shifting levers in the center.

A uniquely shaped radiator of Thomas design is fitted, which is a departure from the conventional flat-front truck radiator.

Included in the regular equipment is a Bosch generator with electric dash and tail lights, electric horn, bumper, windshield and front fenders. The tread is 58 inches front and rear and the standard wheelbase is 150 inches.



The Thomas truck has front doors and is electrically lighted

Timken axle construction on Thomas truck

Reduced Price and Lower Body in New Jeffery Six

Rear Axle Re-designed to Permit Underslinging of Springs — Inherently Balanced Crank-shaft

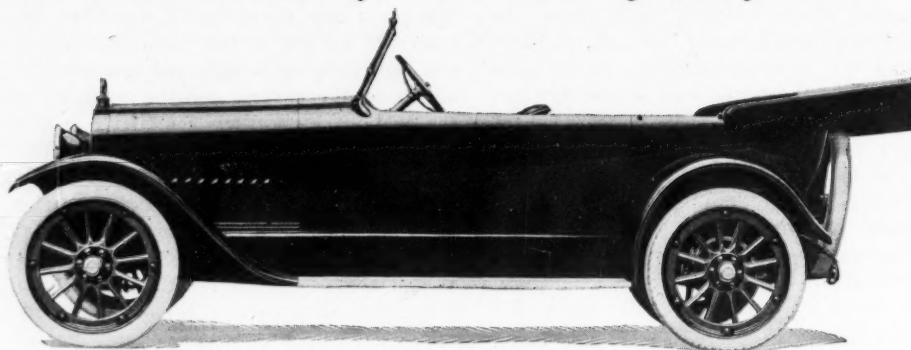
FOLLOWING closely upon its announcement of the new roll-edge four, the Thomas B. Jeffery Co. is now ready with its model 671 six, materially altered in specifications and lower in price than the previous model. Two changes are of particular interest. The rear axle has been redesigned so as to permit the underslinging of the car's springs, materially lowering the body and yet maintaining about the same road clearance. The line of vision is $7\frac{1}{2}$ inches lower in the new six than it was in the previous model.

The other departure is the inherently balanced crankshaft, its construction being such that a nearly perfect balance is acquired without the use of balancing attachments.

Dominant Features

The dominant features of the new Jeffery six, which will retail at \$1,365—lower by \$85 than the selling price of the old six—are its long, low, hammock-slung body and its smooth motor performance. The top swing of the body gives the car a phenomenal ability to cling to the road at high speeds. The oversized inherently-balanced crankshaft is chiefly responsible for the fact that the motor is very free from vibration.

Changes in the body design have been many. While the car, as a whole, has been made larger, the wheelbase having been increased 4 inches to 125 inches,



The line of vision in the new Jeffery six is $7\frac{1}{2}$ inches lower than in the previous model

the low under-slung body makes the six look much longer than it really is. All changes in the body measurements have been made with a view to riding comfort as well as appearance.

The motor, with its $3\frac{1}{2}$ -inch bore and $4\frac{5}{8}$ -inch stroke, gives a piston displacement for each cylinder of 44.5 cubic inches and a total displacement of 267 cubic inches, developing 53 horsepower. The dimensions have not been changed.

The motor is Jeffery built, block-cast with grey iron cylinders and crankcase integral. The poppet valves are located on the right side. The main bearings are all of die cast babbitt, there being three of them measuring $2\frac{1}{4}$ by $2\frac{1}{8}$ inches in front, $2\frac{1}{4}$ by $2\frac{1}{2}$ inches center and $2\frac{1}{4}$ by $3\frac{1}{4}$ inches in the rear.

The lubricating system is a gear pump, driven by bevel gears from the camshaft with a combined force feed and splash system. Oil is forced to all camshaft and crankshaft main bearings and to the drive chain and is fed to the pan in which the lower end of the connecting rods dip. All connecting rods, piston and piston pin bearings are fed by this splash system. Two gallons is the oil capacity.

Again referring to the new crankshaft its large size reduces chance of contortion or twisting and seems to do away with the slightest vibration. This is true regardless at what speed the motor is driven.

Moreover, larger bearings prevent strain and disintegration of the crankshaft. The six will be advertised as "the car without vibration at any speed." Another noticeable change is the use of the Morse silent chain in front of the engine instead of helical gears. This is adopted to assure more quiet running.

One striking feature of the starting and lighting equipment, which is a two-unit Jeffery-Bijur system, is a new type of starting motor. It represents the latest development in the automatic engagement type of starting apparatus. The lightest touch on the switch starts the motor.

The gearset is in unit location with the motor and is equipped for three speeds forward and one reverse. The gear ratios in low are 14.6 to 1; in second 8.2 to 1; in high 4.5 to 1 and in reverse 19.5 to 1. Jeffery taper roller bearings are used throughout.

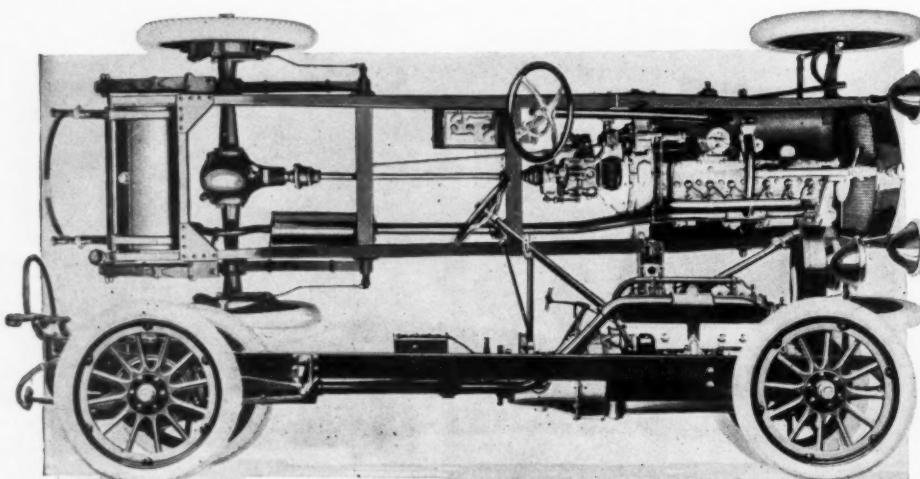
Hotchkiss Drive

The Hotchkiss type of drive has been maintained with the semi-floating type of rear axle. The rear axle, however, has been subjected to more changes than any other part of the car. It is made of malleable iron center with strong alloy steel tubular ends. The differential is readily removable by taking off the rear cover, and the pinion and large driven gear are provided with adjustments and holes in the supporting case for making these adjustments; spiral bevel gears provide drive.

Particular attention has been paid to the task of obtaining long-distance comfort for the driver. The gear lever and emergency brake lever have been lengthened so as to eliminate the necessity of the driver bending over, while the driver's seat is about 1 inch roomier than the other front seat.

As for the rear seat, it has ample room for three persons of almost any size. It is 48 inches wide and 18 inches deep, and the distance between the front of the back seat to the back of the front seat is 32 inches.

As in the former six, the two auxiliary seats fold into the backs of the front seats. Between the front edge of them and the back of the front seats there is 9 inches of knee room. The seats themselves are



Top and side views of chassis of new Jeffery six, showing new straight-line frame and flat, underslung rear springs

14 inches deep. Passengers in the rear seats have 8½ inches of knee space between them and the auxiliary seats.

Free accessibility from the rear of the tonneau to the front seats is afforded by a wider aperture between the two front seats. It is now 8 inches wide.

A good idea of how the passengers sit in instead of on the car can be obtained from the fact that the distance from the floor to the top of the rear seat is 24 inches, while that from the floor to the top edge of the back seat cushion is 12½ inches.

Summed up, the floor of the new six is 3 inches lower than that of the old six. The running board is about 15 inches from the ground. A pitch of 16 degrees has been given the windshield, which is 20 inches high. This is in line with the trend of motor car fashions and carries out the general symmetry of the car.

There isn't a flat surface anywhere on the body. Every piece of metal is curved both ways, this to make the construction stronger and to facilitate the even distribution of paint.

The seven-passenger touring car sells for \$1,365, the sedan for \$1,530, and the roadster at \$1,335. As announced some 6 weeks ago, the prices of the new Jeffery roll-edge four are \$1,095 for the seven-passenger, \$1,260 for the sedan and \$1,065 for the roadster.

SAXONS IN RELAY RECORD

Detroit, Mich., July 22—Forty-three Saxon six motor cars, racing in relays, established a transcontinental relay record when the last car reached San Francisco precisely at 4:40 Saturday morning, 6 days, 18 hours and 10 minutes after leaving New York city. This record from coast to coast was made carrying a message from Mayor Mitchel, of New York, to Mayor Rolf, of San Francisco, over the Lincoln Highway route.

An official observer started with the first Saxon car at 10:26 a. m. Saturday, July 15, and went the entire distance by changing from car to car as the relay progressed. The cars were driven by regular Saxon dealers, and while the official mileage of the Lincoln Highway is 3,331 miles, it is stated that the total distance traversed was considerably more than this, due to detours, etc. The Saxons averaged about 25 m. p. h. for the entire distance. Forty-two stops had to be made, in order that the official note bearer could change from one car to the next.

PACKARD FINANCIAL STATEMENT

Detroit, Mich., July 22—In a comparative statement of its capitalization, net worth, dividends and surplus for the 7 years beginning September 1, 1909, and ending at the close of the current fiscal year on August 31, 1916, the Packard Motor Car Co. shows aggregate earnings of \$18,636,506 after deducting more than \$9,000,000 for depreciation during this

7-year period. The earnings for the present fiscal year, 9 months of which are based on actual figures and the last 3 months estimated, amount to \$6,050,000, as compared with \$2,769,518 for the year 1914 to 1915, which was the best previous earnings for the company.

In offering this statement, F. R. Robinson, comptroller of the company, points out that the figures for the fiscal year—1915 to 1916—contain a conservative estimate covering the last quarter of the year and after paying regular preferred and common cash dividend and deducting the 10 per cent common stock dividend declared February 1, 1916, and the 50 per cent common stock dividend to be distributed August 1, the balance in the surplus account at the end of the year will undoubtedly exceed \$6,376,344. In the 7 years the capital stock of the company has been increased from \$5,000,000 common and \$5,000,000 preferred to \$11,656,930 common stock and \$8,000,000 preferred. In the same period the net assets have increased from \$10,766,847 to \$26,003,274.

DETROITER ADDS ROADSTER

The Detroiter Motor Car Co., Detroit, which heretofore has manufactured a touring car only, now has added a roadster body to fit the same six-cylinder chassis and priced at \$1,098. The new roadster body adheres to strictly modern lines, with sloping hood and cowl, slanting windshield and sloping rear deck. There is room for three passengers in the wide seat, and at the rear there is a large compartment for luggage or other articles. This rear deck is specially provided against water leaking through. In order to meet the tastes of any purchaser,

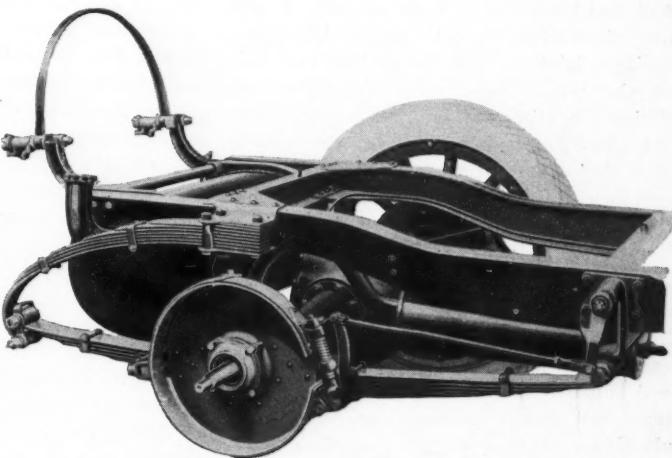
the new roadster is sold with option of colors and upholstered in leather to match.

The chassis is fitted with a 3½ by 4½ Continental engine of the L-head type, cylinders cast in block and head detachable. A Ball carburetor is supplied, also the two-unit Auto-Lite starting and lighting system with the starter acting on the flywheel through Bendix drive. Timken axle and bearing equipment is also employed in the chassis make-up. Tires are 33 by 4 on artillery wheels and demountable rims.

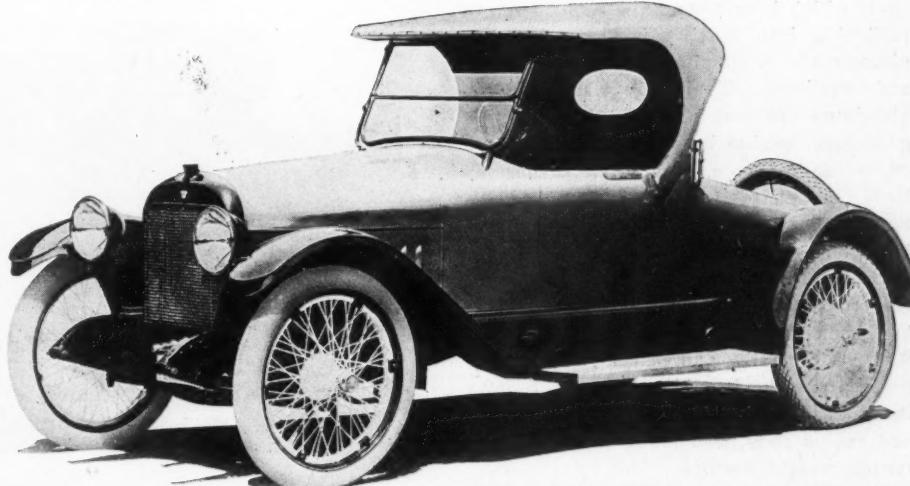
Among the equipment features might be mentioned the Stewart speedometer, gasoline gauge, ammeter, ignition lock, electric horn, extra rim and complete tool and tire repair paraphernalia. The wire wheels, shown in the illustration, are not standard equipment, but are fitted at an additional cost.

WALDON RESIGNS FROM CADILLAC

Detroit, Mich., July 24—Sidney D. Waldron, vice-president in care of the engineering of the Cadillac Motor Car Co., has resigned. His future plans are not given out but it is not believed that he will again enter the motor car industry actively. Mr. Waldron has had a wide experience in the motor car business, relinquishing his position as vice-president of the Packard Motor Car Co. to go to the Cadillac company about a year and a half ago.



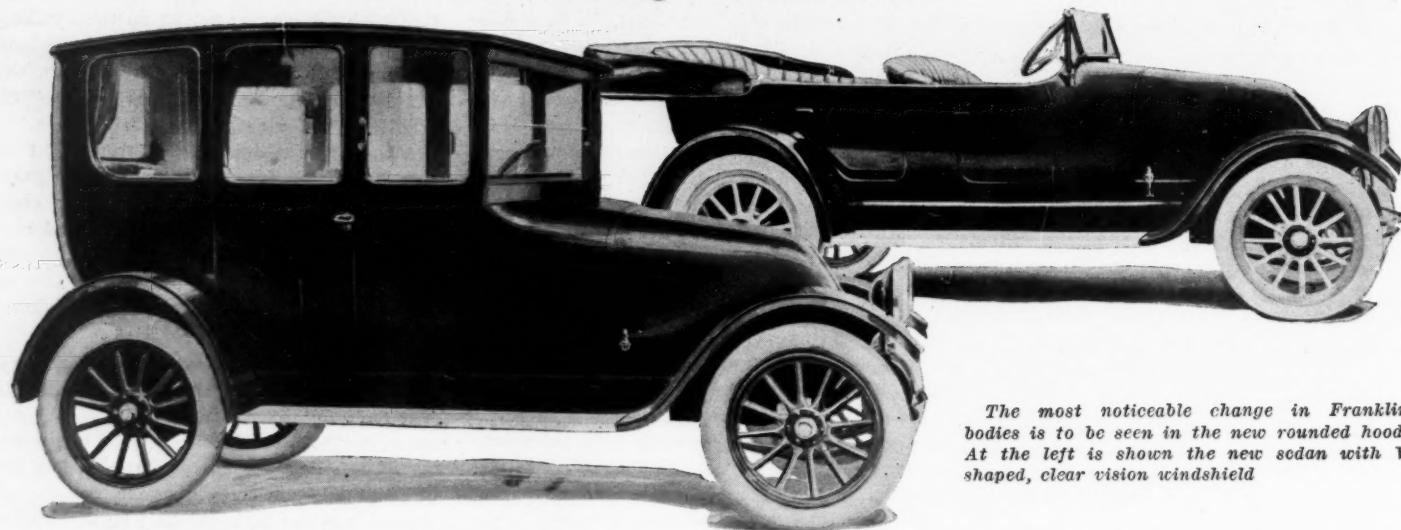
The underslung rear springs in the 1917 Jeffery six are long and flat, making an unusually easy riding car



New Detroiter roadster now being built on six-cylinder chassis at \$1,098

1917 Franklins Lighter, Cheaper and More Economical

Material Reduction of Unsprung Weight Makes Car
Easier Riding than Predecessor



The most noticeable change in Franklin bodies is to be seen in the new rounded hood. At the left is shown the new sedan with V shaped, clear vision windshield

THE Franklin Series 9 has all the fundamental features of previous Franklin cars, and has them developed to a higher degree. The two most important principles that have always been involved in Franklin construction are scientific light weight and resiliency. The basis of each is laid on air-cooling, wood sills, full-elliptic springs, drive through the springs and tires of the proper size. The weight of the Series 9 touring car is 2,280 pounds without gasoline; a reduction of 400 pounds over Series 8. All the other types show a corresponding result in this weight elimination.

The new engine is lighter, being a trifle smaller in the bore, the gearset has had several pounds cut out and both axles are lighter. All the petty details have been examined with a microscope, so to speak, and ounces cut here and there, more forgings and fewer castings are used and aluminum takes a bigger part than ever.

In the Series 9 car there are 133 separate drop forgings, which in many cases include parts which heretofore have been made of malleable iron castings. There are 150 pieces made of aluminum, both sheet metal and castings. Typical of the use of aluminum are such units as the rear axle gear case, engine base and oil pan, valve cages and covers, gearcase, carburetor body, mudguards, running board shields, body and hood. Special stress has been laid on reducing the weight of the parts below the springs. In the design of the front axles, 30 per cent of the weight has been saved in comparison with the Series 8 Franklin, and in the rear axle, 25 per cents. The Franklin company follows its usual policy of eliminating torque tubes and radius rods because of this light unsprung weight feature.

The principal car of the Franklin series is, of course, the five-passenger touring

job which sells for \$1,850. The four-passenger roadster costs \$1,850 also and there is a two-passenger roadster at \$1,800, this car having a very big boot under the rear deck, which would hold enough baggage for a 3-months' tour. The sedan costs \$2,750 and the brougham, which is merely a smaller sedan, \$2,700. In addition to these cars, there is a limousine for \$3,000 and a very smart town car at the same price, and the eighth model is a cabriolet selling at \$2,650.

Franklin expects to make 10,000 cars in the next 12 months, of which about 7,000 will be the touring car and 1,400 roadsters for two or four. Of the sedan, 1,000 will be made and the other closed types will complete the schedule. It is thought probable, however, that the demand for the four-passenger roadster will exceed this estimate, judging by the orders now being placed by dealers.

Although it produces its maximum of 31 horsepower at a higher speed than the

maximum of the older motor the new engine is hardly a high-speed design, the peak of the power curve coming at about 1,700 r. p. m. The maximum torque is 112 pounds and occurs at a little over 1,000 r. p. m. It is a small engine, the $3\frac{1}{4}$ by 4 in dimensions for the six cylinders making the total piston displacement 199 cubic inches and the formula horsepower is 25.3 On high the gearing is 3.9 to 1, the tires being 32 by 4 inches on open cars and 32 by $4\frac{1}{2}$ inches on closed models.

The connecting rod and main bearing surfaces are all liberal in size, efficiently lubricated by a force feed system with interior driven gear pump, used with such success on all the later models of Franklin cars. Cylinder walls and wrist pins are lubricated by the oil thrown from the connecting rod bearings in the form of a fine spray. They are protected from excessive oil by correctly proportioned baffle plates.

The crankcase, oil pan, starting crank bearing and valve cases are aluminum cast-



The new Franklin motor weighs 150 pounds less than the previous model. The design tends toward accessibility of all parts

ings. The crankcase is split horizontally on the line of the main bearings, permitting easy adjustment and examination of all internal parts. The valve mechanism is the same as all recent Franklin designs, except that some of the parts have been altered to secure greater stiffness, lightness and freedom from joints.

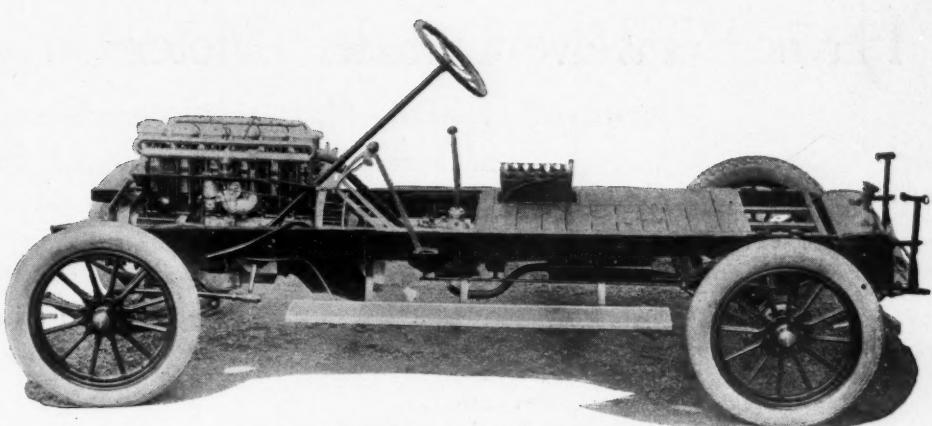
Lifter rods are tubular with hardened steel plugs in the top. At the lower end, the valve lifter is spot-welded into the same tube. The valve walking beam adjustment screw and the lifter end of the valve walking beam are made rounded so as to roll on the flat stem end and lifter end, eliminating much side thrust.

The timing gears and chain are inclosed in an oil-tight case at the front of the engine, and the magneto gear has been eliminated entirely, as the new ignition system is driven by spiral gears off the cam shaft. A Kellogg tire pump is driven from the rear end of the starter through a hexagonal end shaft.

The advantages of the aluminum pistons leading to their use in the Series 9 Franklin are pretty well understood. They reduce the inertia force very largely and make the motor livelier and quieter. It does not take so much power to start the pistons in motion and to get them up to the proper speed, because of their less weight.

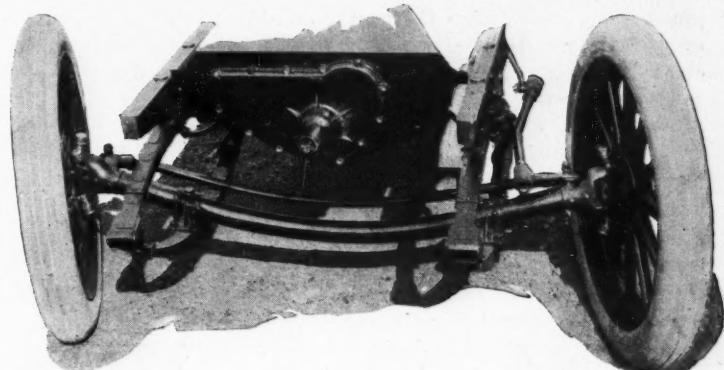
The flywheel and fan are combined in one piece bolted to the flange on the rear end of the crank shaft, as in all recent Franklin practice. Instead of blades being riveted into the flywheel, they are cast integral, being set into the iron much in the same manner as the fins in the cylinders. At intervals there are extra heavy cross members to give the proper firmness to the flywheel.

The most marked change in the engine is the substitution of Atwater Kent ignition for the magneto. The Franklin engineers consider that the battery system gives better results at low speeds and equal results at high rates of revolution, while it is again an opportunity for saving weight. For control of the ignition point the Atwater Kent automatic advance is used, there being no spark lever on the steering wheel. Lighting and starting are performed by a Dyneto single-unit machine driven by silent chain and located



Franklin retains its wood frame construction. Note raised position of carburetor and separation of gear shift and emergency brake levers

The weight of the Franklin front axle has been reduced 30 per cent by refinement of the design



at the front right end of the engine; it is very accessible and the wiring is also simplified to the last degree. All the important junctions, fuses, etc., are carried on a panel in the cowl board and the spare bulbs for the lamps are also held in sockets on the same panel, so that they are perfectly protected and always accessible in a hurry.

The carburetor is placed higher up and being closer to the intake, there is less chance for condensation. The design of the carburetor this year meets the conditions developed by the low grade of gasoline now on the market.

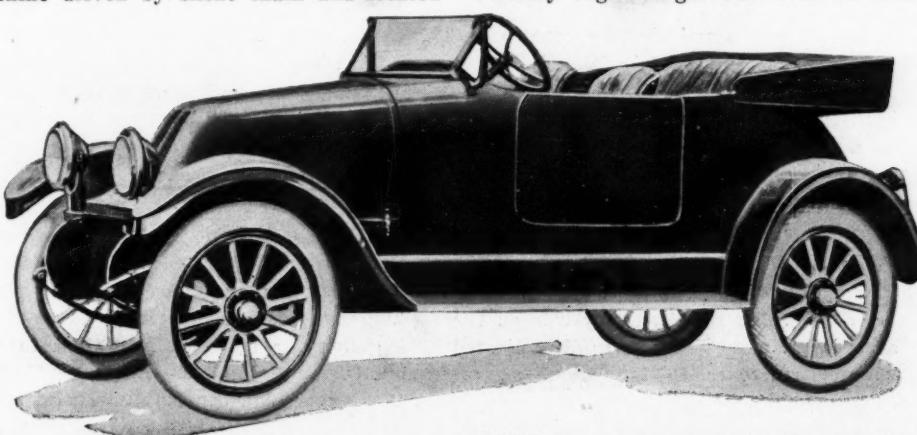
Incidentally, it is stated by the manufacturer that the new model with its reduced weight will be able easily to break all previous economy records, and that the average man using the car in the average way without taking any special care for economy ought to get well over 20 miles

per gallon. This, of course, being a minimum and not a maximum. In other words the economy is improved in the same proportion as the weight is decreased.

Series 9 Franklin is a ball-bearing car; no roller bearings are used. The type of bearings used are Gurney Radial ball bearings and the Gurney 100 per cent Radio-Thrust ball bearings. The gearset is designed for lightness and quietness. The shafts, instead of lying in the same horizontal plane as heretofore, now lie in the

In working out the lubricating system the feed is practically all under pressure and is regulated by the output of the gear pump which is located in the oil base having a large screen on the suction side and also a gauze strainer in the form of a tray covering the whole top of the oil pan, but there are no dip troughs as the crankshaft is fully drilled and the oil from the main bearings finds its way to the connecting-rod lower ends.

Separate pipes lead to the timing gears and to each of the camshaft bearings while the piston pins are oiled by an inversion of the usual method of fully forced lubrication systems. As a rule the connecting-rod serves to carry the oil to the wristpins and then to the cylinders, but here the oil feeds to each cylinder at a point about $1\frac{1}{2}$ inch from the bottom and reaches the wristpins through tiny holes drilled in the aluminum pistons. The latter have a V groove cut near the bottom, which is used to lift oil into the cylinder, as the absence of splash troughs in the body of the crankcase cuts down the amount of spray pres-



An entirely new design of four-passenger roadster is offered on the 1917 Franklin chassis

(Concluded on page 47)

Haynes Twelve-Cylinder Motor to Fit the Six Chassis

Sturdy Overhead-Valve Powerplant Is Designed for Greatest Accessibility of Parts

ALTHOUGH one experimental motor was displayed at the shows last winter and more or less mysterious rumors have been going about concerning the offering of the Haynes Automobile Co., Kokomo, Ind., of a twelve-cylinder car, it is not until now that the factory has found it advisable to offer its newest creation to the buyer. The reason for the seeming delay in announcing the new twelve can be credited to the fact that production of the six has thoroughly taxed every facility of the factory. A vastly increased floor space, available in several newly-constructed buildings, is now being utilized for the construction of the new twelve motor.

The new powerplant is interchangeable with that of the six, and the chassis specifications for 1917 will be continued without change. In the motor lies the only difference between the two models, even the supporting members being the same. The same bodies are also used in both models.

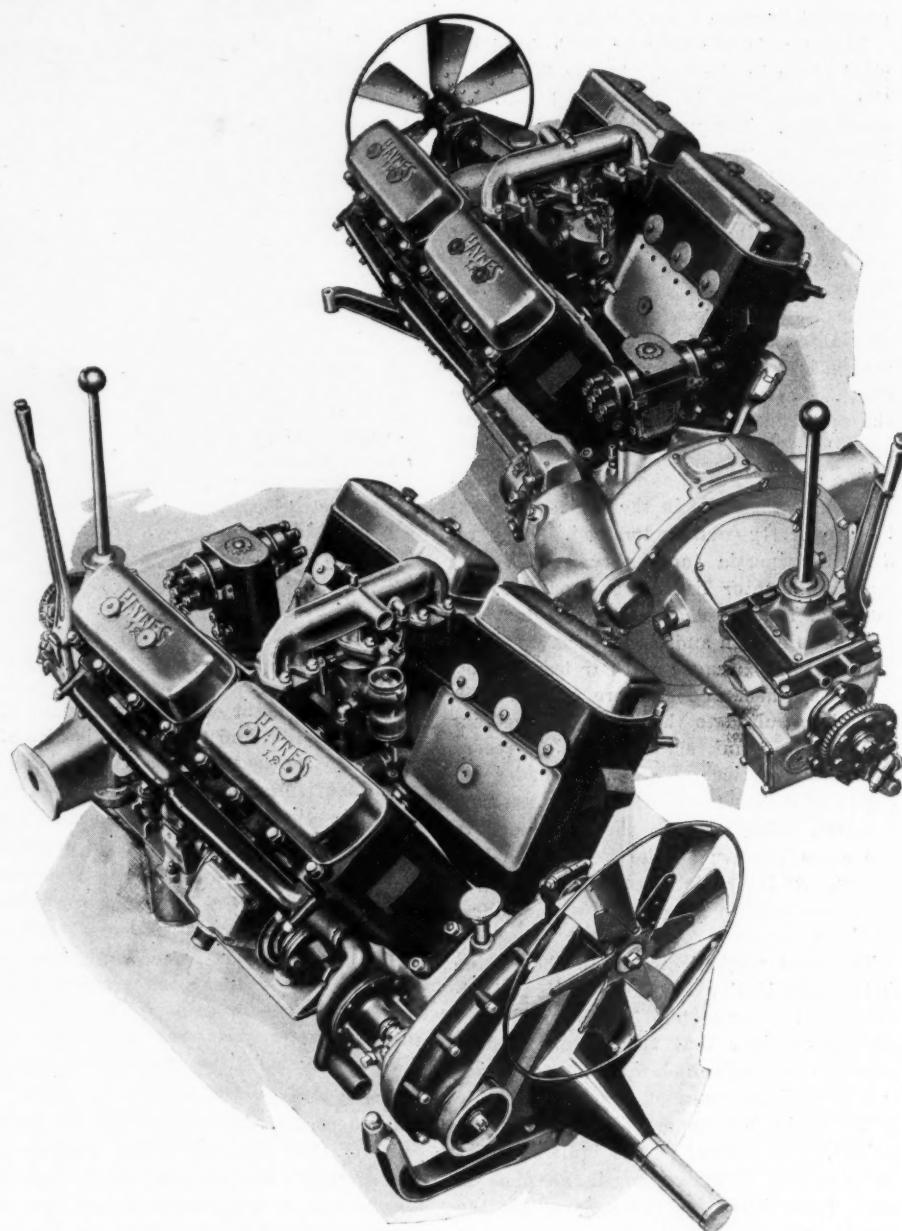
The new twelve motor is exceptionally light in weight. It is of the high-speed type with light reciprocating parts. Great attention has been paid to the matter of quick acceleration, which is a talking point of the twelve motor, but which has received especial attention by the Haynes engineers.

Valve-in-the-Head Construction

The cylinders are in two sets of six, each series block-cast, of valve-in-the-head construction with removable cylinder head. The two series are set at an angle of 60 degrees on the motor base in the shape of a V, which is, of course, conventional practice. The bore and stroke are $2\frac{3}{4}$ by 5 inches, giving a piston displacement of 356 inches and an A. L. A. M. horsepower rating of 36.3. All the cylinders are separately ground after boring. The operation has been considered necessary to insure equal compression and consequently more nearly perfect motor balance.

Pistons in the twelve motor are aluminum alloy, carrying three non-leaking piston rings, with an oil groove to drain the oil to the reservoir, which minimizes the chance of oil entering the combustion chamber and the consequent formation of carbon deposits.

The valve construction is a departure from Haynes practice, inasmuch as valve-in-the-head design is utilized. One of the big reasons why Haynes adopted overhead valves for the twelve was because of the fact that it permitted an accessibility to the motor accessories which could not possibly be gained in a side-valve construction. The carburetor and inlet valves are close together on the inside of the V; the water



Two views of Haynes twelve-cylinder powerplant, showing convenient location of accessories and distance between carburetor and electrical equipment, which removes danger of fire

pump, generator and air pump are in convenient places and the ignition is on the front end of the motor, which keeps the ignition away from the carburetor and vacuum tank—placed on the rear of the motor—eliminating any chance of fire from this source.

The same type of crankshaft is used on the new light twelve model as on the present Haynes light sixes. Two connecting rods are arranged side by side on the same crank pin. Each is readily adjusted without reference to the other—an arrangement which can not be obtained in the forked-rod construction. The cylinders are staggered so that opposite con-

necting rods will not play on the same center line.

A split crankcase is used with all crankshaft bearings carried in the upper half. This section is aluminum, while the lower half is seamless pressed steel, and cast to create the oil reservoir.

Lubrication is of the force feed and splash type, a constant flow of oil at all times being assured by the use of a plunger type of pump with a capacity of $\frac{1}{2}$ gallon per minute. According to the manufacturers the temperature of the oil can be kept at a constant low point from the fact that air can strike the reservoir directly, there being no pans to retain the

heat. Instead of using a mud-pan, the pressed steel oilkease half is fitted tightly between the motor and the car frame.

The Leece-Neville starting and lighting system is used on this motor as it is on the six. This system embraces a generator for charging the battery and a motor for cranking the engine. Starting is through the Bendix system of drive. Ignition is through a distributor fed by the storage battery.

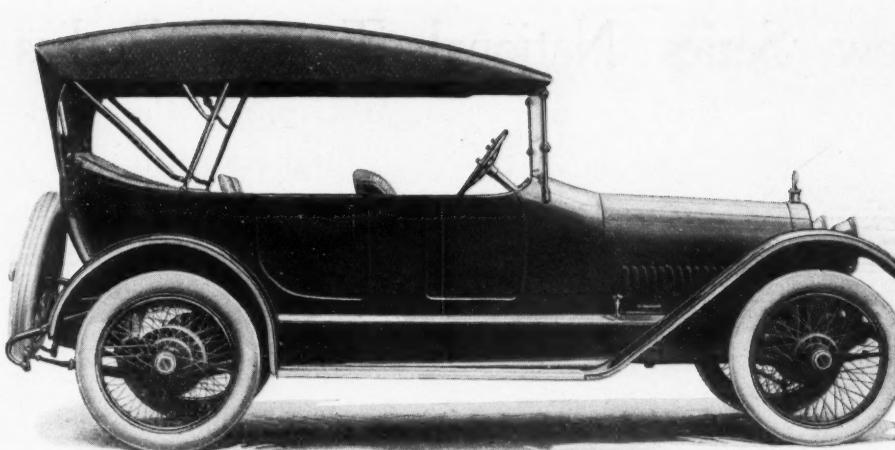
As previously mentioned the chassis construction in both sixes and twelves with the exception of the new twelve motor is exactly the same as in the 1916 models. Features in the construction are floating rear axle with spiral bevel drive, three-plate, dry-disk clutch, cog-adjusting bevel pinion, three speed selective gearset, etc.

Haynes bodies at present include five and seven-passenger touring cars, a three-passenger roadster and a sedan, with promises of something in the nature of a surprise in new closed bodies and a four-passenger roadster to be brought out later. Seat covers are featured on all models as regular equipment. Both five and seven-passenger models are equipped with adjustable individual front seats. Auxiliary seats in the large cars are of the stow-away type, and are entirely out of sight when not in use. The seats drop down into the floor and all that remains visible are two rings, used for pulling them up again.

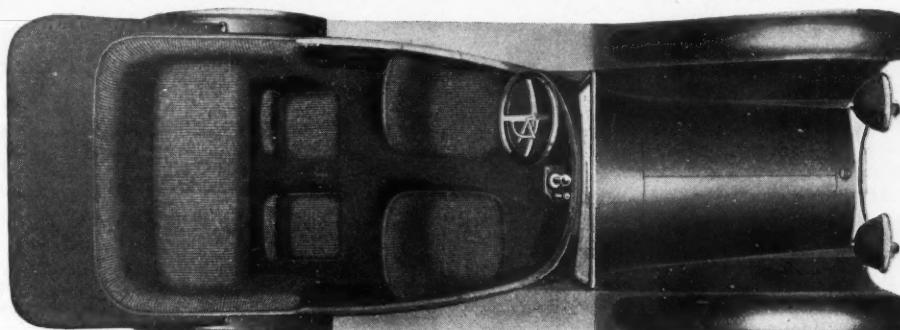
The wheelbase is 127 inches, with a turning radius of slightly over 21 feet. Tires are Goodyear cord, 34 by 4½, on the light twelve and Goodyear or U. S. optional on the six. Prices of the light twelve are: Five-passenger, \$1,985; three-passenger roadster, \$1,985; seven-passenger, \$2,080; five-passenger sedan, \$2,650, and seven-passenger sedan, \$2,700.

MUTUAL BENEFIT FOR BOWSER MEN

South Bend, Ind., July 24—The S. F. Bowser Oil Tank & Pump Works, of Fort Wayne, which some time ago promised its employes \$10,000 to start a mutual benefit association when the plans for the organization had been made by the employes, made good its promise in a most substantial way when 10,000 silver dollars were turned over to the treasurer of the new organized Bowser Mutual Benefit association. The dollars were poured into a box 7 feet long, 1 foot wide and 6 inches deep. S. F. Bowser, president of the company, made the principal address at the meeting. The plan of the association briefly is:



Seven-passenger body of Haynes twelve, wire wheel equipped



Seating arrangement of seven-passenger Haynes. Seat covers are regular equipment

\$40 per month will be paid a member unable to work on account of illness or accident; survivors of an employee who dies will receive \$125 for burial expenses and \$25 per month for three years; old age pension will be \$30 per month.

COTTON SCALE SPOILS CARS

Milwaukee, Wis., July 22—Wisconsin motorists are suffering from the appearance of the cotton scale pest on maple trees throughout the state. Cars left standing under or near maple trees for only a short time become covered with specks resembling oil spots, but which are sticky and refuse to come off. Only the hardest kind of work will remove the spots, and then the finish is generally damaged.

MAXWELL DAY IN KANSAS CITY

Kansas City, Mo., July 21—Maxwell day in Kansas City brought 400 owners of Maxwells together. The Acton-Parke Auto Co., agent for the Maxwell, had arranged the program and prizes had been announced for the most beautifully decorated car, for the car in best condition,

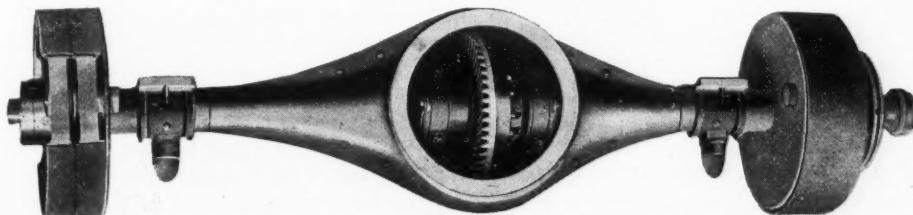
and for various contests in the water festival that was a final feature of the day. More than fifty of the cars were elaborately decorated, and all of them were furnished with flowers especially for the occasion.

The ornate line of motor cars wound through the streets on the busy Saturday afternoon, led by a cordon of motorcycle policemen, who cleared the way; and attracted the attention of many thousands.

MACHINIST STRIKE IN CREAM CITY

Milwaukee, Wis., July 22—Milwaukee motor manufacturing companies, among which are some of the largest in the country, have thus far been only slightly affected by the big machinists' strike, called during the week by the unions when the employers' association refused to consider their demand for an 8-hour day without reduction of pay from the present 9-hour day. The strike has long been expected, although there was hope of averting walkouts when the employers on July 1 voluntarily reduced the weekly working schedule from 55 hours to 52½ hours, which means that overtime starts from the 52½ hour each week instead of beginning with the 56th hour.

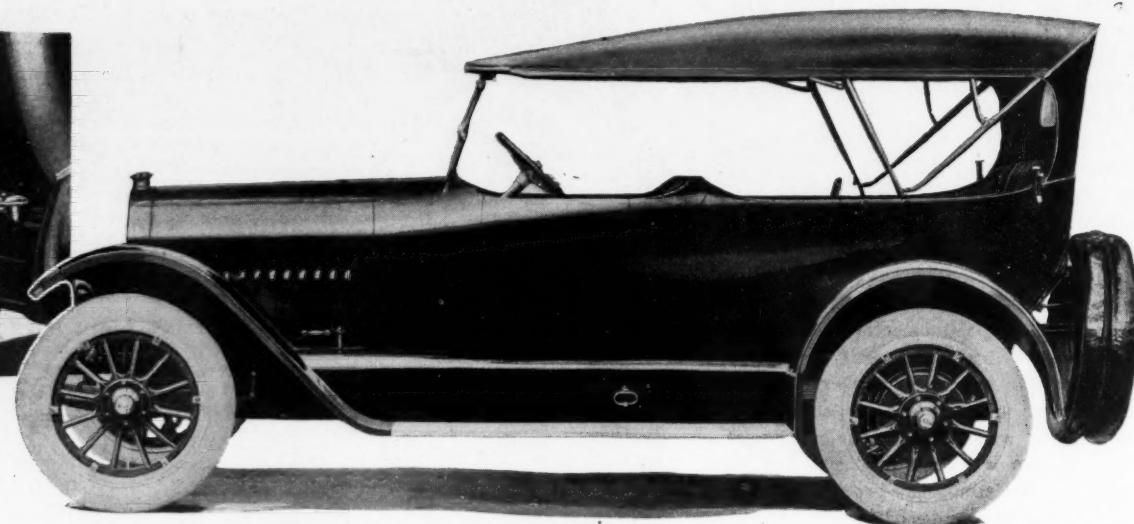
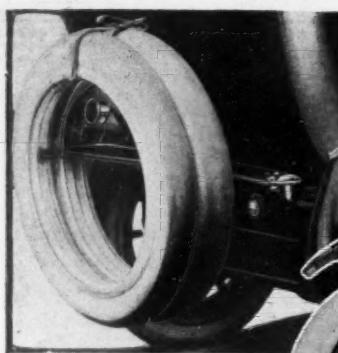
About 2,000 machinists in five or six plants were called out during the week, the unions striking one or two plants each morning. The Beaver Mfg. Co., which supplies motors to several car manufacturers, experienced a walkout on July 21, but it is stated that only a small proportion of the working force is on strike.



The Haynes rear axle is built in the factory's shops. A spiral bevel gear is featured, and the housing components are of pressed steel

New Series National Touring Bodies Increased in Size

Full Seven-Passenger Capacity Provided—Prices Up on All Highway Models



At the left is a view of the new tire carrier of the National Highway twelve and the view at the right shows the seven-passenger model

A NEW series of National Highway twelve-cylinder cars is just going through production in the Indianapolis factory and incorporates several changes over the model marketed last season. This is a companion car to the National Highway six which is being continued. Following the general trend, prices are higher this year on the twelve-cylinder model than last, the increase being \$130 per car, making the price now \$2,150. This includes extra seats, however, while last year they were sold at \$30 extra.

Many Detail Improvements

A number of detail improvements have been made throughout the entire car. In the first place the touring body has been increased in size and now instead of being a six-passenger job, it has a full seven-passenger capacity. Although the improvements throughout are quite numerous the same general chassis layout on the 128-inch wheelbase will be adhered to. Instead of an option of 34 by 4½ or 36 by 4½ tires, the regular equipment will be 34 by 4½ which was the choice of the majority of buyers during the last season.

Probably the most notable change on the new National Highway twelve-cylinder car is in the seven-passenger touring body design. Although the chassis is the same length, the new body is 3 inches longer. It has a center cowl and there is an aisle between the two front seats. In the tonneau under the center cowl are two locked package compartments. The front seats are larger in every dimension and there is also more room in the driver's compartment. The body is wider than in the former series and there is more carrying capacity under each of the three seats; in addition there is a tool compartment in the left front door as on the former models.

The new Highway twelve cars are fur-

nished with five different body styles. In addition to the seven-passenger touring car there are a four-passenger touring car, four-passenger roadster, five-passenger all-weather sedan of the Springfield type and a three-passenger coupe. In the open models there is a new design of side curtains and these are fitted to the doors and so arranged as to permit the curtains to open with the doors, thus giving a closed car effect which is very useful in rainy weather.

The arrangement of the extra seats has been carefully worked out so that the tonneau floor is smooth and the folding seats and their supports are fitted flush with the floor when the seats are folded. A new and specially designed tire holder in the rear has the advantageous feature of requiring but one strap and provision is also made that the spare tires can be locked if so desired. Another feature of convenience is that the gasoline tank filler has been moved over to the right side near the right fender. It is now provided with a hinged cover which is held in place with a wing nut. The gasoline tank cover cap is easier to open than the old one and by being hinged it is impossible to lose it. A change which alters the appearance of the car somewhat from the older model National is that the radiator has been altered so that it is now 2 inches narrower and 2 inches higher than before. This gives a proportionately higher hood and has necessitated somewhat the change of the customary National radiator emblem, as far as size goes. The shield design, however, is still maintained in spite of the change in size.

A study of the exterior of the car will reveal some other minor differences which may be particularly noticed in the fenders which are an inch wider and of new design

in the rear and also the slanting windshield, the straight side of body instead of the tumble-home type formerly used, the flush doors and the necessary alteration in general lines to coincide with these changes. In equipment also a few alterations have been made particularly on the dash, where a new oil pressure gauge with a unique dial design has been installed and also a new combination ignition and light switch which is locked by a special key. The keys are not interchangeable.

The cloverleaf design which was marketed last year as a three-passenger body has now been made into a full four-passenger job. This has been accomplished by increasing the body size all around and by moving the rear seat back 4 inches. The back of the rear seat is higher, making it fully as comfortable as the front seats.

Motor Built in National Shops

The National Highway twelve motor is a product of the National company's own shop. It has a piston displacement of 338.5 cubic inches and a bore and stroke of 2¾ by 4¾. It is a high speed type throughout and is particularly distinguished by the use of outside valves which make it very accessible. The electrical apparatus and other motor accessories are located between the arms of the V where they can be easily reached.

Two separate blocks of six cylinders each are used, both L-head type and with two independent camshafts. No effort has been necessary to install synchronizing means for the two valve actions as they are altogether independent. The timing gearset is quite similar to that used on the ordinary T-head motor, and the drive for the auxiliary apparatus in the center of the V is taken off the right camshaft by a silent chain.

ent. As to the oil pressure, this is not very high, the relief valve blows off at 25 pounds per square inch. When the engine is idling the pressure is about 10 pounds and it rises gradually with the speed till the limit is reached.

One Water Pump

There is only one water pump, but this is duplex internally, the rotating member carrying two sets of vanes. One set feeds directly upward into the block of cylinders on the right and the other half of the pump delivers through a passage cast in the aluminum of the crankcase to the left block. This cuts down the piping materially and makes for efficiency and simplicity.

The clutch is an aluminum cone with leather face and the unit gearset provides three forward speeds, all shafts therein running on annular ball bearings. The propeller shaft is tubular and bears two universals, and the rear axle is floating. A flat cantilever rear suspension is employed and it may be noticed that the center bracket has the swivel pin located beneath the spring instead of above it as is more usual. The springs are 51 inches long and 21.2 inches wide with eight leaves each and their action is extremely satisfactory. The front springs have no noteworthy peculiarity, being 38 inches long and 2 inches wide, but special precautions have been taken in laying out the steering and the use of large ball thrust bearings for the front axle swivels makes the steering control powerful.

Franklin Lighter, Cheaper

(Concluded from page 43)

same vertical plane. This construction permits of strong webbing along the sides that keeps the main shaft and counter-shaft constantly at the same distance center to center. There is no spreading and hence change in alignment which would



The new National radiator is higher and narrower than the previous model, but the characteristic shield design is still evident. A complete set of tools is carried in the left front door

tend to cause noise. The transmission case is made of aluminum.

The main improvements in the front axle construction show simplification, principally. It continues to be of tubular type, the size being $2\frac{1}{4}$ inches by $\frac{1}{8}$ inch and the material nickel steel. The yoke pin has been fastened in the steering knuckles and turns in the ends of the yokes. In this way the bearing surface is kept large and at as great a distance from the center as possible. At the same time the spread of the yokes is reduced and the whole layout made more compact. This greater bearing surface and also the use of hardened steel bushings give longer wear. Individual grease cups are attached to lubricate each yoke bearing.

The Series 9 rear axle is of the semi-floating type. The gear case is an aluminum casting amply reinforced by ribs. Nickel steel tubes are riveted to this case, and on the outer end of the tube malleable brake carriers are attached by rivets.

Chassis frame follows the usual Franklin practice. It is made of the very best quality of second growth white ash. The

lumber is carefully picked, air-seasoned, kiln-dried and put together. It is $1\frac{3}{4}$ inches wide, built up of three pieces glued and screwed together, bottom and top being covered with a cap strip glued and screwed in place and excluding moisture.

The front and rear springs are both full-elliptic, 36 inches in length, and $1\frac{3}{4}$ inches wide, having a deflection of 160 to 165 pounds per inch. They are built up of six plates in each half.

In building this latest car, the Franklin company held to the same passenger size and roominess which has been followed during the past year. Some marked improvements in coach work have been made, the most noticeable being the hood design, which is such that a continuity of line from the front of the car to the rear is preserved without a break.

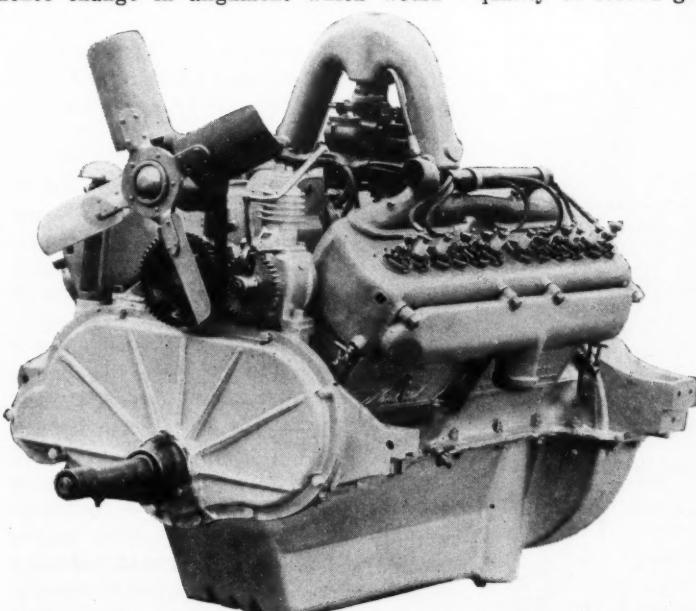
The touring car is strictly for five people. Its appearance is marked chiefly by its low setting. The present type allows passengers to sit two inches nearer the ground, though the road clearance has been maintained within a fraction of an inch the same as Series 8. A noticeable feature is the outside door handles, which point out a trend towards greater convenience. These are common on all Franklin types.

The town car is also one of this year's additions to the Franklin line. It is an emergency seven-passenger car, having two disappearing auxiliary seats that face the rear. The upholstery is a new fabric, fawn colored mohair plush, called Mocho. The interior lights all have Tiffany glass coverings. The car is equipped with men's smoking set and ladies' companion.

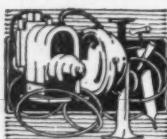
The sedan and brougham, which were popular types last year, have been improved by building the bodies with V-front windshields. These are made up of four pieces, each of which is detachable. The construction eliminates two body posts on the sides and allows a greater breadth of vision and an entirely unobstructed view of the road.

The front and rear mud guards are made of sheet aluminum of a new and simpler design, that strictly conform to the body style. The running board shields are also aluminum. Provision has been made for attaching luggage at the front of the left running board. Strap loops are mounted to retain the straps which secure trunk or other luggage.

This year the Stewart vacuum system of gasoline feed is regular on all models. The gasoline tank on all models is a steel stamping, terne plated, carried at the rear.



View of National Highway twelve motor, showing accessible location of all parts and compactness



The Accessory Corner



New Type of Plug Insulation

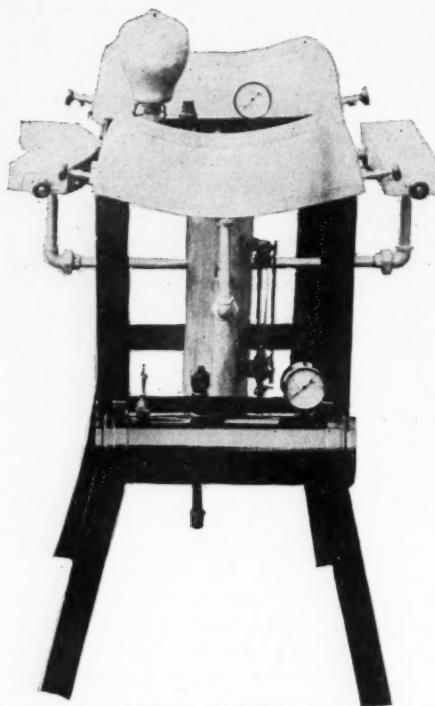
THE new Vesuvius spark plug, manufactured by A. R. Mosler & Co., New York City, is of different insulating construction than any previous types put out by this company, and is designed with a view of providing indestructibility; in fact a guarantee is offered that the plug will outlast the motor. A heavy, double-step insulator construction is provided, which insures correct centering of the center electrode, and distributes the pressure on the shoulder above the center of gravity. The construction of the gasket is of such a nature that a gastight seat is provided, at the same time allowing general simplicity in design.

Compact Steam Vulcanizer

The Anderson Steam Vulcanizer Co., Worthington, Ind., has recently introduced a complete vulcanizing set which will take care of ordinary repairs on all tires ranging in size from $1\frac{1}{2}$ -inch bicycle size to a 37 by 5-inch motor car tire. The equipment is complete with a steam boiler, which holds enough water to run 10 hours at 60 pounds steam pressure. The boiler is equipped with a water gauge, steam gauge, pop valve, drain cock, relief cock, etc. The machine is equipped with two sectional molds, a large one to take care of a 16-inch section in 4, $4\frac{1}{2}$ and 5-inch casings, and a small mold to take care of a 15-inch section in 3, $3\frac{1}{2}$ and 4-inch tires. The hot-plate is especially designed to take care of the bead molds, of which there is both straight-side and clincher, also of the motorcycle and bicycle molds. When not being used in connection with either one of these, it can be used as a tube plate, having a capacity of 7 tubes at a time. The machine has a capacity of four tubes and three casings at a time. The price is \$125 complete.

New Goodyear Truck Tire

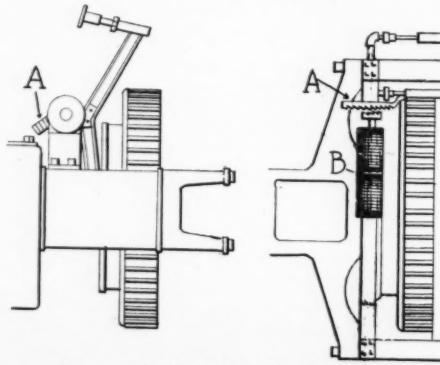
An addition to the motor truck tire field is the new Hand-Attachable Cushion Tire just introduced by the Goodyear Tire & Rubber Co., Akron, Ohio. The new tire is designed for use on motor trucks and fire apparatus, and is claimed to be a decided improvement upon the Cushion Demountable type which has played so large a part in commercial and fire service. As its name suggests it can be applied to the wheel by hand, a particularly desirable feature in tire equipment. The new Hand-Attachable has a channel base identical in construction with that of the Goodyear S-V Tire which for an entire year was offered free to truck owners if it failed to show lowest cost per mile in competition with other makes. The tread design of the new tire is non-skid, and is the same as that of the Cushion Demountable, but the pockets or indentations in



Vulcanizer which will handle three casings and four tubes at one time



The Litl-Fiend auxiliary air intake and a Mosler plug with new type of insulation



Device which electrically locks brakes

the sides of the tire that provide accommodation for the displaced rubber as the tire revolves on the street, are changed from rectangular to oval shape. The new tire is tougher, more resilient, and resists road punishment better than the type which it supersedes.

Auxiliary Air Intake and Primer

A device designed for the purpose of saving gasoline by feeding additional air to the intake manifold, priming the motor and introducing a water cure for removing carbon is sold by the White Mfg. Co., 619 Main St., Cincinnati, O., under the name of the Litl Fiend. The device is nothing more than a plug which is screwed into the side of the intake manifold, inside of which is a valve automatically operated by suction, which is suspended on a spring of sufficient pressure to introduce just the right quantity of fresh air into the intake gases. In case one desires to prime the motor it is only necessary to press the spout end of the priming cup against the automatic valve, press it open and squirt in the primer. With the Motor running the same operation can be performed with a can filled with water, which will, of course, vaporize in the motor and tend to break up the carbon deposits so that they may be blown out of the exhaust. The price of the device is \$2.

Storage Batteries of Every Size

The Heissler Storage Battery Co., Chicago, Ill., makers of the Hytork Storage battery, is now producing types to meet the demands of every car on the market. The principal claim for the battery is that the construction of the plates is of such a nature that defects as buckling, abnormal sulphating and the shedding of active material, are eliminated. The new batteries are made in 6-volt, 12-volt, 18-volt and 24-volt sizes, ranging in price from \$24 to \$62, depending on the size and capacity.

Lock Holds Brakes in Position

Leon Goldmerstein Co., who will be remembered as having recently read a paper on aeroplanes before the Metropolitan section of the Society of Automobile Engineers, has entered the accessory field with a novel form of motor car lock which prevents motion of the car by holding the brakes in position. The inventor points out that this will not only prevent the car from being stolen, but will prevent it from rolling down hill after the brakes have been applied and locked. The device is electro-magnetic in operation, consisting essentially of a commutator switch and a solenoid which carries a bolt and locking device at the end. Application of the switch causes the coil to become energized moving the core backwards and carrying with it the bolt. By means of a slot ar-

angement in the cap of the solenoid, which acts in relation to a groove in the core, the device has been made jolt-proof. Another provision which has been made is that the brake can be locked regardless of the amount of wear on the brake band. The solenoid is made armor-clad to increase its magnetic efficiency and mechanical strength, and it is carried on a bracket bolted over the crankcase.

Motor Grease in Tubes

A complete line of high-quality motor car lubricants is being placed on the market by the Crew Levick Co., Land Title Bldg., Philadelphia, Pa., one of the largest and oldest petroleum refiners in the country. One of the novel articles in the new line is a tube similar to the kind used for tooth pastes which is filled with grease providing a clean and economical method of packing grease cups in motor cars. Three tubes sell for \$1. There are three distinct cartons of each kind of grease, and one special carton—the Lincoln highway kit—which contains one tube of each of the three greases. Mistokleen, another product of this company is a spray cleanser for cleaning and polishing at one operation all polished surfaces on the motor car or in the home. It is described as containing only pure mineral oils, scientifically blended and when wiped off with mistokloth, leaves the surface perfectly dry and lastingly lustrous. Each Mistokleen outfit includes a patented rustless sprayer ready filled and a mistokloth, all packed in a sealed cardboard container. The outfit complete ready for use retails at \$1.25.

To Drive Ford with Foot

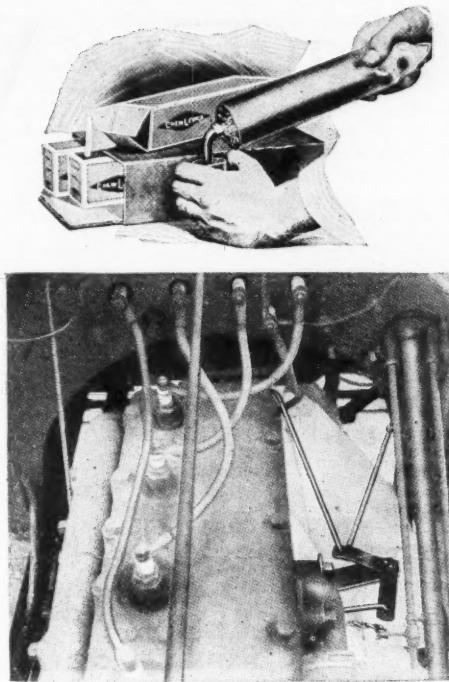
The Bull Dog Foot accelerator, for use on Ford cars allows both hands to be free for steering and sounding a warning. It is manufactured by the W. H. Thomas Co., Spencer, Iowa, and is of very simple construction. All parts are made of soft steel, insuring them against breakage, and the lever pull is direct from the carburetor to the accelerator pedal. The foot rock, which goes with every accelerator, makes it possible for the driver to hold his throttle steady while driving over rough roads. The hand control is, of course, retained and the foot pedal is entirely independent from it, so that either may be used if desired. \$2.50 is the selling price.

Soap Cleans All Parts of Car

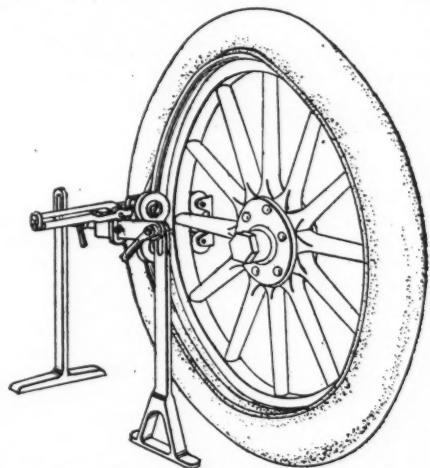
Rexine auto soap, made by the Rexine Co., Sheboygan, Wis., is made of such materials that it can be used on the body, metal work or upholstery without harming any of it. The product dissolves easily in cold water and is claimed to be entirely free from acid. It will remove all dirt and grease from any part of the car, and as an added attraction to the motorists, will not crack or chap the hands. Rexine is put up in 1 quart and 1 gallon cans, 5 gallon pails and half barrels and barrels.

Clincher Tire Remover

The Mason Automatic Tire Remover and Replacer Co., Paducah, Ky., manufactures a simple device which can be carried in a



Above—Grease in tubes for economical use.
Below—Foot accelerator installed on Ford



Compact machine for removing and replacing clincher tires



New non-skid tire manufactured by the Brunswick-Balke-Collender Co., makers of billiard tables and bowling alleys

tool kit for the rapid removing of tires from clincher rims. To operate the machine, it is necessary to place it against the wheel as shown in the accompanying illustration, and tighten the set screw and

a tail nut, which will clamp the fiber wheels against the felloe, pull the tire over with the spanner so as to place the two flanged rollers under the clinch of the tire, and lock the rollers under the case so that it is only necessary to roll the wheel one revolution to make the tire drop off. The same machine can be used for replacing the tire. It is said with the use of this device, any size of clincher tire up to 5 inches can be removed in less than 5 minutes. The machine folds up like a jack knife and weighs less than 15 pounds.

Harmless Body Polish

Shadbroco, as it is called, is a new body polish being marketed by Shadburne Bros. Co., 2328 Michigan Ave., Chicago, and is said to contain nothing harmful to the car finish, such as turpentine or muriatic acid. An interesting feature of the new polish is that it can be used for two purposes, one when the base is shaken in with the other fluid and another when the base has settled to the bottom. When the polish is thoroughly shaken it is in a condition to be used on the body and when the base is settled in the bottom the lighter fluid on the top serves as an excellent glass polish.

Dash and Trouble Light

The Auto Specialty Co., Galesburg, Ill., is the selling agent for a combination dash and trouble light, known as the comet, which really gives double service for a single price. When in use as a dash light the comet fits into a socket in the instrument board and to all appearances is an ordinary dash fixture. If a trouble light is wanted it is only necessary to pull the fixture from its socket and a long cord will permit carrying it to any part of the car. An automatic rewind in the shape of a spring within a neat case which is fastened under the hood, takes the light back to its place on the dash. There is nothing to disconnect or no cord or apparatus to put away. The comet may be fitted on any car. The price of the complete equipment, ready for installation, is \$5.

Top Dressing Convenient to Use

S. C. Johnson & Son, Racine, Wis., makers of Johnson's cleaner and Johnson's prepared wax, are now offering another accessory which, together with the two products just mentioned, are claimed to be the only preparations necessary to keep the appearance of a car in first-class shape. Johnson's black-lac is the name of the new product, and its use is in touching up leather cushions, side curtains, tire covers, trunks, and pantasote and mohair tops and linings. One coat of black-lac gives a rich, black surface, which is durable and waterpoor. It is easy to apply and is said to dry in 15 minutes, and once applied is permanent, that is, it will not rub off on the clothing. The product can be used on the finest leather without injurious effect, in fact, is claimed to preserve the leather. It has another use in blackening worn spots on fenders, rims, running boards, hoods, radiators and lamps.



From the Four Winds



Employees of the Champion Spark Plug Co. in recent preparedness parade at Toledo, O.

PENNSYLVANIA Has 200,000 Cars—On July 20 license No. 200,000 for this year was issued by the state highway department of Pennsylvania. The receipts since January are \$2,128,878, or \$592,026 more than the same period in 1915.

Mail Carriers Want Cars—Rural letter carriers of the state of Washington in annual session have gone on record as favoring the use of motor cars for rural carriers. The carriers also went on record as favoring roads suitable for motor cars the year around.

Great Place for Irish—The city council of Springfield, Mo., has amended the motor vehicle ordinance, to provide that the green and yellow lights specified must be kept burning during darkness—an omission from the ordinance that prevented prosecutions. Jitneys must use green lights, and taxicabs yellow.

Dallas Gets 19-Cent Gas—For the first time in several weeks Dallas, Tex., motorists are riding on 19-cent gasoline. This week gasoline has dropped from 20 to 19 cents. It is generally believed here that still another decline will be noted within a few days. This is the cheapest gas has been in months. The highest price paid was 23 cents. No reason is given for the decline.

R. I.-Ontario Reciprocity Off—Notification has been issued by the government of the province of Ontario in Canada that license reciprocity with the state of Rhode Island is not in existence now and that any provisional arrangements made between the Ontario and Rhode Island governments are cancelled. The blame for this action on the part of the Canadian authorities is said to rest entirely with Rhode Island. When Ontario made the arrangements with Illinois, New York, Pennsylvania, Ohio and other states permitting the free use of licenses on both sides of the line an offer also was made to Rhode Island, from which state many motorists annually go into Ontario, but the Rhode Island government emphatically re-

fused to consider any arrangement with the Ontario government.

5 Miles Per Hour Limit—Independence, Mo., has passed an ordinance holding the speed limit in the business district to 5 miles per hour and increasing the limit in the residence district to 20 miles an hour.

Flat Towing Rate—The Washington Auto Co., Spokane, Wash., has recently inaugurated a towing service. For \$10 this company makes an agreement with every motorist to tow them in from any point within 15 miles of the city to any garage desired. The service has proved popular.

Dallas Jitneys to Go—Jitneys must go in Dallas. This is the edict of City officials. The city has reached the point where either the jitney or the street railway company must stop business, because the street railway company officials claim they are losing money in Dallas. The jitney business during the last 6 months has cut the gross earnings of the street railways more than \$100,000, no exact figures being obtainable. It is

expected a law will be drafted that will virtually put the jitney bus out of business in Dallas.

Ban on Search Lights—The government of the province of Quebec has informed the Automobile Club of Canada, Montreal, that the swivel spot light on which the opinion of the law department was asked, is a searchlight within the meaning of article 1417 of the motor vehicle law, and carrying of it would be contrary to law.

Missouri Car Statistics—The first 5 months of Missouri's fiscal year with reference to motor vehicle licenses—starting February 1—showed more cars licensed than during all last year. St. Louis has 18,098 now, against 16,421 last year; Kansas City 10,847, against 9,309. Outside these two big cities, Jasper county, which contains Joplin, has the largest number of cars, increasing from 2,668 in 1915 to 3,892 on June 30, 1916.

Connecticut Registrations Gain—June receipts for the registration of motor cars in Connecticut amounted to \$49,943.35 as against \$32,791.65 for the same period a year ago. This is an increase of approximately 52 per cent. Total receipts for the fiscal year up to June 1 are \$683,252.08 as against \$484,634.02 for the corresponding period in 1915, or a gain of 41 per cent. It is estimated that the gross business this season will amount to \$750,000, which will be available for road repairs.

1909 Overland Used for Tractor—C. G. Bonnell & Son, Medford, Minn., recently completed the purchase of a Model 30 Overland engine, which is to be used for a gasoline tractor, in general farm work. This car was bought by the Auto Supply Co., the Overland dealer in that territory, in January, 1909. Its cost was \$1,250. Since then it has been in almost constant use for livery purposes. During that time it has been driven 250,000 miles, equivalent to almost ten times around the world. Its future usefulness will be limited to the use of the engine for a tractor. The body and running gears will be used for

Coming Motor Events

TRACTOR DEMONSTRATIONS

- July 24-28—Hutchinson, Kan.
- July 31-Aug. 4—St. Louis, Mo.
- Aug. 7-11—Fremont, Neb.
- Aug. 14-18—Cedar Rapids, Ia.
- Aug. 21-25—Bloomington, Ill.
- Aug. 28-Sept. 1—Indianapolis, Ind.
- Sept. 4-8—Madison, Wis.

SHOWS

- January 6-13—New York show.
- January 27-February 3—Chicago show.

a trailer and boat cart. The engine alone was sold for \$100, almost 10 per cent of the original cost of the car 7 years ago.

Has Kansas License No. 1—John Gray, Curwin, Kan., for many years chairman of the roads and bridges committee of the lower house of the Kansas legislature and an active worker for good roads all the time, has the honor of holding motor car license No. 1 of Kansas. J. R. Burrow, Topeka, formerly secretary of state, again, as for several years, has tag No. 2.

Banners for Safety First—A new phase of the Safety First campaign which is being waged in Pittsburgh, Pa., was sprung when a number of delivery cars of downtown department stores and retail establishments appeared with large traffic banners on their sides. The banners were printed in large red letters so that they attracted much attention and were easily read by all. Such pithy expressions as "Think of the other fellow and dim that headlight," "Get numbers of criminally careless motorists," etc., were the inscriptions. It is thought that these traffic banners will prove a well-worth-while educational feature in the campaign.

Good Roads Activities

Marking I-V Way—Markers of concrete, carrying a target with the design "I-V Way" are being installed between Chicago and Peoria, along the picturesque Illinois Valley Way. These markers are 12 feet in height, and should last for many years.

Dallas Marking Roads—Not to be outdone by counties of the northern and eastern states, Dallas county, Tex., is going to place road signs at every mile in Dallas county and also at every road. These signs will be on steel posts and will be of the very latest style. Contract for them was awarded last week by the Dallas county commissioners.

Texas' Share in Road Fund—Texas' share of the proposed government expenditure of \$75,000,000 on good roads will be \$4,515,750. It is expected that the next session of the legislature will pass a law creating the Texas highway commission. Then efforts will be made in Texas to raise \$5,000,000 for good roads.

Alton Way Elects Officials—At a meeting of boosters of the Alton Way trail, held at Carlinville, Ill., last week, new officers were elected as follows: President, Edward Lott, Carlinville; secretary-treasurer, S. T. Moore, Carlinville. Thirteen vice-presidents, one for each city between Alton and Springfield, were chosen and they will look after the trail in their vicinity.

Cut-Off in Oregon—The old military road across the Cascade mountains is to be improved for motor travel. From Eugene, Ore., the road leads up the middle fork of the Willamette river crossing the summit of the mountains just south of Diamond Peak at Lake Crescent and thence across the headwaters of the Deschutes to Klamath marsh. It is a much shorter route than the one used at present via McKenzie pass. From Eugene to Crescent by way of McKenzie pass and Bend the distance is 170 miles. By the old military road it would be 109 miles.

Mark Cannon Ball Trail—At the annual meeting of the Cannon Ball Trail Association, held in Galesburg, Ill., new officers were elected for the ensuing year as follows: President, E. P. Lovejoy, Princeton; vice-president, Thomas Johnson, Galesburg; secretary-treasurer, R. M. Skinner, Princeton. It was voted to paint the insignia of the trail upon every pole along the route between Quincy and Aurora. A band of black 4 inches wide; a band of white 8 inches wide, and a third band, also of black above the

white, will be painted on the poles, a black ball and a letter "C" to be added to the white space.

River-to-River Road Picnic—The big annual good roads picnic of the River-to-River Road Association of Iowa will be held at Newton, Ia., on August 2. Arrangements are being perfected by the loyal River-to-River Road boosters of Newton for royal entertainment of visitors. The picnic will be held on the grounds of the Jasper County Fair Association and in addition to an elaborate program of entertainment and amusement there will be a good roads address by a speaker of note, probably Senator Lafe Young, of Iowa, the founder of the River-to-River Road.

Meridian Highway Marked—The Meridian highway, extending the full length of Illinois from north to south, has been marked, so that tourists can now make the run from Rockford on the north, to Cairo on the south. At cross roads, signs will be posted giving information concerning tributary roads and routes. A large portion of the highway has been permanently improved and all sections will be graded and dragged. The Meridian road is an economic factor, as well as one affecting the convenience and pleasure of a vast number of persons. It has taken its place as one of the most desirable of the

routes between the north and the south via Illinois. With the rapid changes in progress in modes of travel, the work now being carried on in Illinois on this longitudinal line, far exceeds any mere local or state importance.

Motorists Organize Road Association—The Lancaster County Good Roads Association was formed recently at a meeting of motor car owners in Lancaster, Pa. The association, headed by Dr. William A. Wolf, pledged itself to better roads and more of them.

Jefferson Highway Tourists at Des Moines—Jefferson Highway day was celebrated at Indianola, Ia., recently when a party of officials on inspection tour of the highway were the guests of honor at a good roads celebration. A picnic dinner was served on the campus of Simpson college and a program of motor polo and music offered to regale the crowd. A caravan of Des Moines boosters met the inspection tour at Indianola and after the event there escorted the party to Des Moines, where the members were entertained at the Hyperion Club. The inspection tour continued its journey toward Winnipeg from here.

With the Motor Clubs

To Help Organize Club—Ray C. Chidester, manager of the Milwaukee branch of the Packard Motor Car Co., of Chicago, has been appointed a member of the executive committee of Milwaukee sales managers to organize a Milwaukee Salesmanship Club.

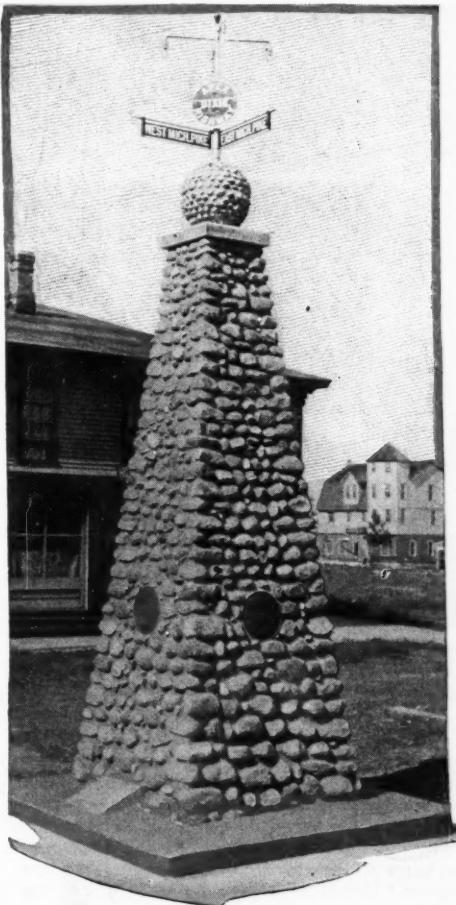
Rockford Club Issues Bonds—The directors of the Rockford, Ill., Motor Club, have inaugurated a campaign to dispose of the bonds to cover the cost of the new clubhouse and grounds. Interest will be paid upon all bonds, and it is believed that no difficulty will be experienced in disposing of the paper.

Dallas Club's Traffic Plans—The Dallas Automobile Club, Dallas, Tex., has begun a campaign for a general revision of the traffic laws of this city. Plans are now being mapped out whereby it is believed a different set of rules and laws may be adopted that will make traffic conditions safer.

Vote On By-Law Change—A special meeting of the members of the Automobile Club of Pittsburgh, Pa., has been called, at which time they will vote on a proposed change in the by-laws, fixing the maximum number of members at 2,000 instead of 1,000, as now provided. The club has 1,150 members, or really 15 more than allowed, but it is not believed that anyone will raise any question regarding the matter. New applications for membership continue to come in.

Clintonville, Wis., Club—A motor club with a membership of 115 has been organized at Clintonville, Wis., the seat of the Four Wheel Drive Automobile Co., under the name of Clintonville Automobile Club. Officers have been elected as follows: President, Edward Felshow; vice-president, John Kalmes; secretary, Will M. Barnum; treasurer, D. J. Rohrer. The principal object is to promote good roads, signboarding, observance of rules of the road, and the general mutual welfare of the public and the motorist.

Club Investigates Dimmer Arrests—A committee from the Cincinnati Automobile Club headed by Frank Lawrence, recently called on Police Chief Copelan and Safety Director Friedlander, Cincinnati, O., relative to a new dimming ordinance. This action was taken because of the great number of motorists being cited to court for not having their lamps dimmed. Manager William Foley, of the Automobile Club, said there is no ordinance covering the dimming of lights. A police order issued by Chief Copelan is at present in force, he said.



DIXIE HIGHWAY MARKER—A monument, 15 feet high, built entirely of cobblestones and cement, was recently dedicated to mark the apex of the Dixie trail running from Miami, Fla., to Mackinaw City, Mich., and the terminus of the East and West Michigan pikes. The stones were contributed by citizens of the village and tourists and the construction work was done by a farmer. The monument, which overlooks the waters of the Straits of Mackinac, was dedicated to Horatio S. Earle, the father of the good roads movement in Michigan.

Among the Makers and Dealers



LEAVES Burd Ring—A. A. Martin, vice-president and sales manager of the Burd High Compression Ring Co., Rockford, Ill., and who organized the company, will retire from that concern August 1.

Johnson Resigns Philadelphia Oakland—T. S. Johnson, branch manager of the Oakland Motor Co., Philadelphia, Pa., has resigned and opened offices in the Abbott Bldg. as eastern distributor for the Monroe Motor Company, Pontiac, Mich.

Chevrolet Plant at Fort Worth—The Chevrolet Motor Co. of Texas, through its president, A. B. Hardy, has authorized the purchase of a 7-acre tract of land as a site for its proposed assembling plant in Fort Worth. The erection of the new plant will be started in the near future, it is announced.

Wichita Truck Plans Expansion—The Wichita Falls Motor Co., Wichita Falls, Tex., has increased its capital stock from \$100,000 to \$400,000. It has met with much success in manufacturing motor trucks at its plant there, and it is stated that it plans greatly to enlarge its scope.

Newton Heads Hollier Sales—Frank L. Newton, who has been assistant sales manager of the Jackson Automobile Co., Jackson, Mich., for the past 5 years, has severed his relations with that concern to become general sales manager for the Lewis Spring & Axle Co., Chelsea, Mich., manufacturer of the Hollier eight.

Goodyear Employs Deaf Mutes—One of the sturdiest and steadiest groups of workmen to be found at the plant of the Goodyear Tire & Rubber Co., Akron, O., is composed of deaf mutes. From time to time Goodyear has accepted them as employees when well recommended and able to pass the physical requirements. So successful have been Goodyear's efforts in training them to become efficient workmen, thereby enabling them to compete successfully with their more for-

Albany, N. Y.—Lasky Motor Car Corp., motor cars, parts, garages; capital stock, \$10,000; incorporators, H. M. Lasky, M. Lasky and H. Lasky.

Albany, N. Y.—F. A. Stuppelbein Motors Corp., motor cars, motor trucks, accessories, etc.; capital stock, \$15,000; incorporators, C. D. Barry, A. D. Grant, F. A. Supplebein.

Albany, N. Y.—H. A. McRae & Co., garage, motors, tires; capital stock, \$25,000; incorporators, P. C. Ford, E. F. Marquette, H. A. McRae.

Albany, N. Y.—Cross Port Motor Co., internal combustion motors, engines, motor cars, patents; capital stock, \$100,000; incorporators, E. J. O'Connell, J. J. O'Connell, Jr., and J. S. Casey.

Augusta, Me.—Armored Tire Co., to manufacture and sell motor cars, tires, pneumatic tires and reliners for same; capital stock, \$100,000.



Scripps-Booth Battery Runs Timing Device—But for the electric storage battery of a Scripps-Booth roadster, the recent races at Ascot Park, Los Angeles, could not have been timed with the electrical timing device. When the race officials tried to test out the timing instrument, just before the contests, it was found that through some error, no electrical current had been supplied. One of them owned a Scripps-Booth car, however, and to him came the happy thought of drawing current from the battery of the car.

Recent Incorporations

Buffalo, N. Y.—Eastern Truckford Co., motor cars, accessories; capital stock, \$20,000; incorporators, E. D. Sullivan, J. H. Sullivan, D. F. Sullivan.

Buffalo, N. Y.—One-Hand Auto Top; capital

TRUCK IS LOCOMOTIVE—This Four-Wheel Drive truck, in the service of the Hanlon & Oakes Co., contractors, of Sioux City, Ia., is used in place of a locomotive to draw a string of heavily-loaded trailers on a narrow-gauge track. The truck itself straddles the rails, and it is interesting to note that enough traction is secured to pull the train easily up a 5 per cent grade, although no load whatever is carried on the body of the truck.

tunate brothers, that the company has received many expressions of commendation for the interest manifested in them.

New Departure Plans Addition—The New Departure Mfg. Co., Bristol, Conn., has acquired more land in the vicinity of the plant and will erect a four-story building 300 feet long. This new building will be known as the ball factory and is to be U-shaped.

Thompson to Get New Berth—E. E. Thompson, at present connected with the branch of the Maxwell Motor Co., San Francisco, Cal., will return to Detroit, Mich., in September to assume the duties of sales superintendent of the Maxwell Motor Co. for the Pacific coast.

Davis Joins Anthony—Olin E. Davis, the San Diego, Cal., boy who won the 1913 Los Angeles-to-Phoenix road race in a Locomobile, and who has been identified with the motor car industry in this section for several years, has joined the technical force of the Earl C. Anthony, Inc., Los Angeles, Cal.

Alvin Organizes Truck Company—Forrest J. Alvin, who was in the accessory field for a number of years and who has more recently been president of the New Era Engineering Co., manufacturers of the New Era car at Joliet, Ill., has recently organized a truck concern in Joliet.

Ziola Sells Carburetor Patent—Henry A. Ziola, Madison, Wis., inventor of electrical and carbureting devices for internal combustion engines, has sold all rights to the Ziola kerosene carburetor to a syndicate of St. Louis capital, headed by James B. Lloyd. It is said that Mr. Ziola received a check for \$30,000 for his patents.

stock, \$600,000; incorporators, F. Dobmeier, E. L. Kunz, W. L. Grove.

Columbus, O.—National Fender & Auto Parts Co.; capital stock, \$50,000; incorporators, J. J. Shevlin and others.

Chicago—Abbot Detroit Motor Car Co., to deal in motor cars; capital stock, \$50,000.

Covington, Ky.—B. B. Hume Automobile Co.; capital stock, \$15,000; incorporators, A. B. Rouse, J. L. Lassing, B. B. Hume, John Keller, F. C. Respess, F. J. Hanlon and J. F. Pieper.

Cleveland, O.—The Esco Motor Lock Company; capital stock, \$10,000; R. H. Lee, F. H. Crew, W. J. Patterson, G. M. Gallagher, and E. M. Holmgren.

Cleveland, O.—Master Motor Car Co., to deal in motor cars; capital stock, \$10,000; incorporators, Charles W. Rush, William G. Radcliffe, L. E. Yaggi, Helen M. O'Boyle, and R. E. Kouba.